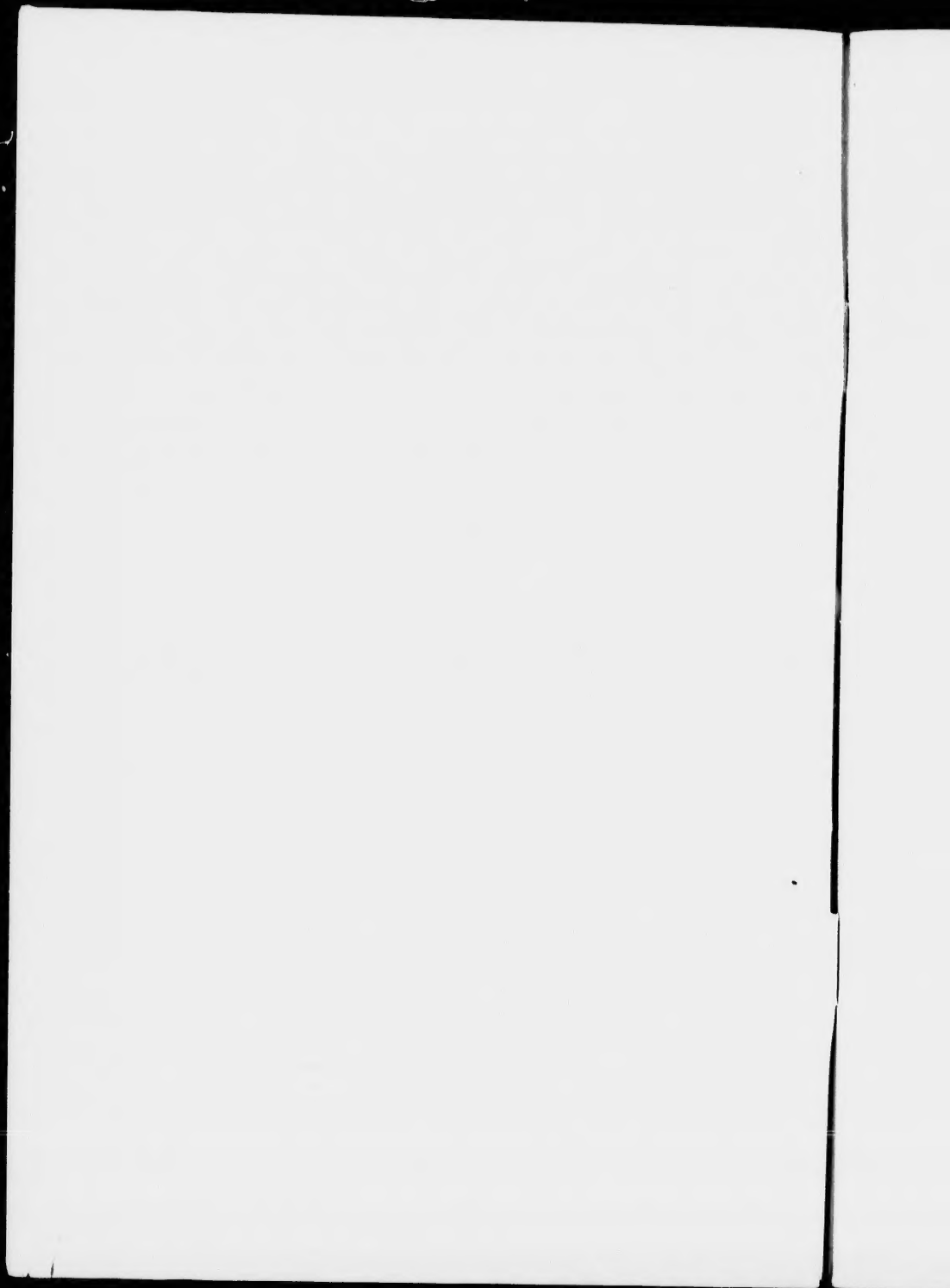


FARMER'S

DAIRY Handbook



232 & 234
KING STREET, R. A. LISTER & CO. WINNIPEG,
LIMITED. MAN.



The Farmer's Dairy Hand-Book.



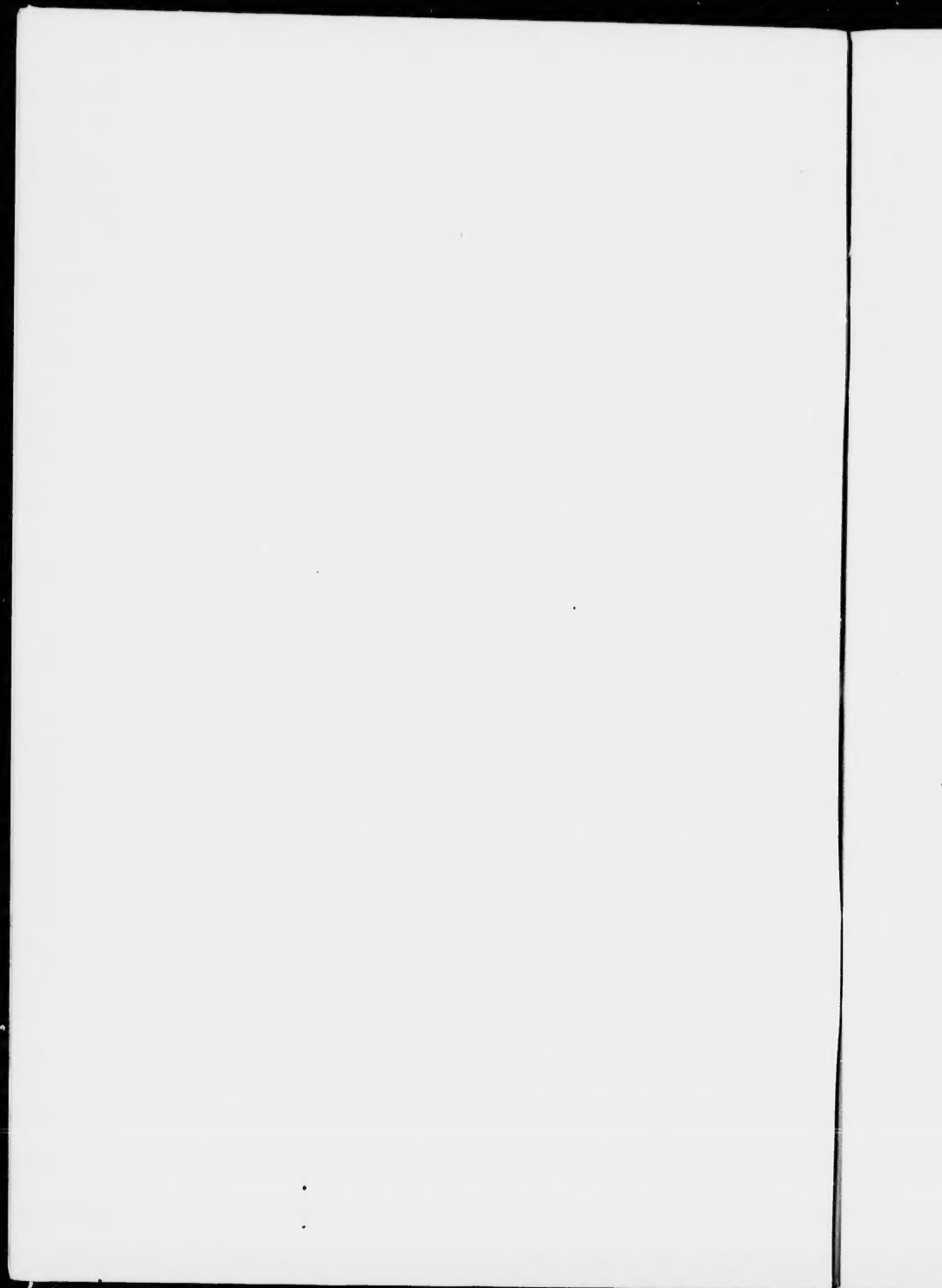
Compiled and Edited by
R. A. LISTER & CO., LTD.



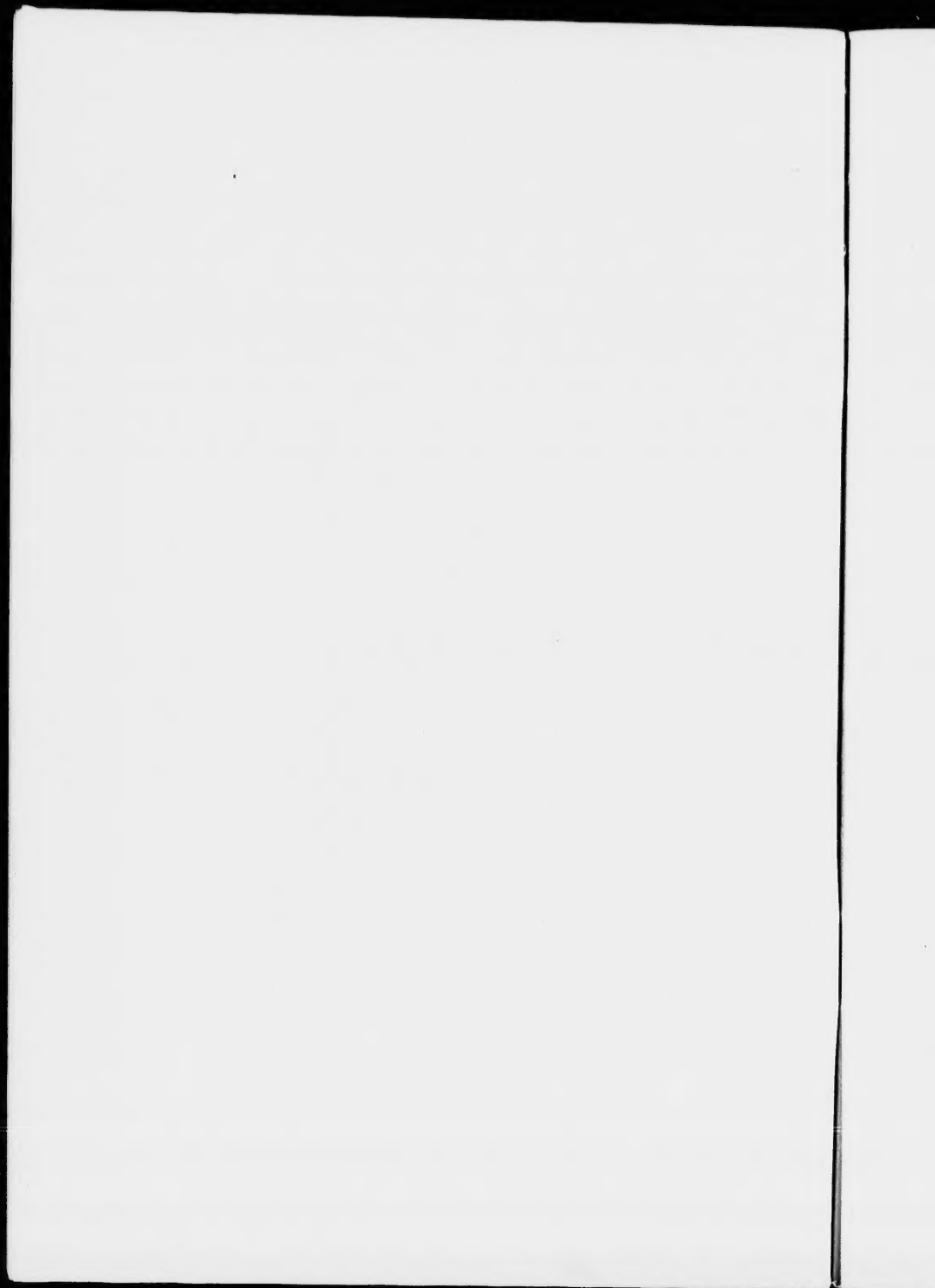
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To the Farmers of Manitoba and the North-West Territories.

Dursley, England,
November 17th, 1899.

Dear Sirs:—

I have often been asked the question, "Is Manitoba and the Northwest Territories suited for dairy farming?" I say, "Yes, it is," and after having spent several weeks every fall and one winter for the past five years, I can with confidence say something further, viz., that these Provinces will never become really and permanently prosperous until a very much larger number of farmers take to producing milk as a staple branch of their business. This is a bold and serious statement, but I make it fearlessly, because I have had experience in other countries where much the same conditions of climate and soil apply.

Take Denmark; the climate being similar in many respects, it has a fairly warm summer and a long cold winter. The thermometer does not fall as low as in Manitoba, but it is damp instead of being dry, which makes the cold felt quite as severely. Necessity has introduced the fur coat outside and the stove inside.

Denmark is a successful butter-producing country, and, although not much larger than Prince Edward's Island, she exports nearly twenty times as much butter as Canada, and as a natural consequence large quantities of dairy-fed pork and veal are produced. Corn, peas, and other grains are imported. The Danish farmers produce milk largely all the year round: the cows are tied up in the stables from October 20th to May 20th, and then turned out in the day time for a month with a blanket on. Long, low cow stables are used, inexpensively built of

wood, with straw thatched roofs. Thirty-nine years ago Denmark was in anything but a prosperous condition; the Government had to step in and pass laws for the encouragement of dairy farming; the prevention of the law breaking up of small homesteads, and similar legislation.

There are in Manitoba and the Northwest Territories descendants of the brave pioneers who cut down the forests of Ontario. Those men I shall always look upon as the heroes of the axe and the plow, of whom the Anglo-Saxon race should be proud. These are the men who should lead in the development of the country of their adoption. The wheat-grower only, is like the man living on his capital instead of his interest; the value of his land is less every year, the crops later, more susceptible to failure and smaller. On the other hand, if he is a real farmer and keeps cows, he has some ready money all the year round, manure for his land, profitable use for his straw, luxuries for his table, employment for every member of his family all the year round. "Whatever thy hand findeth to do, do it with all thy might" should be his motto, and he will be rewarded by having something to sell all the year round, money from cream or butter, separated milk for calves and hogs; the latter will consume lots of things now wasted. The home will be brighter and the boys and girls prepared for the battle of life.

I intended to refer to another country, but my letter is already too long; I mean Lombardy, the only really wealthy part of Italy, where there are some of the finest creameries in the world. There the hum of the Alexandra and Melotte Cream Separators are familiar and welcome sounds.

Yours faithfully,

R. A. LISTER.

FARM BUTTER MAKING.

INTRODUCTION.

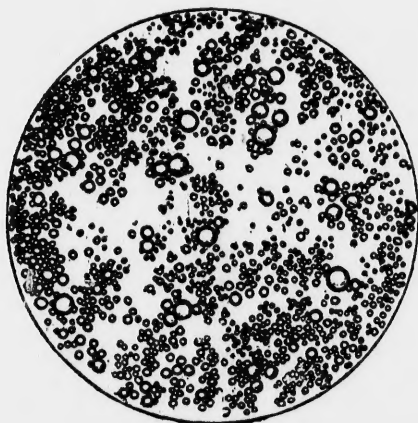
In spite of the increase in the number of creameries all over the country within recent years many farmers still continue to have the butter made at home. Only too often those who make the butter are without special training for the work and have very little, if any, knowledge of the constituents of milk or the principles involved in its care and management. In consequence of this a large quantity of dairy butter is of inferior quality, and often meets with such poor demand that the prices the farmer receives are far from being remunerative.

A remedy may be found in a universal patronage of the creameries. The creamery system will work great improvements, as has undoubtedly been shown by the creameries already established in the country. As long, however, as there are sections where there are no creameries, improvement can only come through a better understanding of the nature of milk, and the effect which different methods of treatment have upon it for butter-making.

THE CONSTITUTION OF MILK FAT.

To be a successful butter-maker it is necessary that one should know something about the raw material one is handling. Milk when fresh is a thin emulsion of butter fat in a watery solution of albuminous matter, milk-sugar and mineral matter. Under the microscope it appears to be a clear liquid, in which is suspended an immense number of small fat globules that are more or less collected in groups. These globules vary considerably in size, the smallest being about one ten-thousandth of an inch in diameter and the largest about one two-thousandth of an inch. The average diameter of these globules in cows' milk is about one five-thousandth of an inch. Twenty-five fat

globules placed side by side so that one would touch the other would span a distance about equal to the thickness of ordinary writing paper. The size of the globules varies considerably with different cows and with different breeds. It is characteristic of the fat globules of some breeds of cows, such as the Jersey and Guernsey milk, to be large and quite uniform in size, while those of some breeds are smaller and some are uniform and some variable. The number of globules in a given volume



A Drop of Milk Magnified 1090 Times.

From Kirchmer's Wirtschaft.

of milk varies greatly, according to their size and to the percentage of fat. These globules are known as cream. Milk containing large globules will cream more rapidly and completely than milk with small globules. Uniformity in the size of globules is also desirable, as globules of a uniform size will reach the surface in about the same time, if the setting system for creaming be in use. The centrifugal cream separator will be found in all cases to do the most efficient work in creaming, the principle of which machine, with full explanations, will be taken up later on in this Hand Book.

Don't fail to buy an "Alexandra" or "Melotte" Cream Separator.

The average compositions of cows' milk is approximately as follows:—

Fat	3.5 p.c.
Milk Serum {	Nitrogenous Matter (Casein, Albumen, &c.).. 4.3 p.c.
	Milk Sugar..... 4.5 p.c.
	Ash..... 0.7 p.c.
	Water..... 87.0 p.c.
100.0	

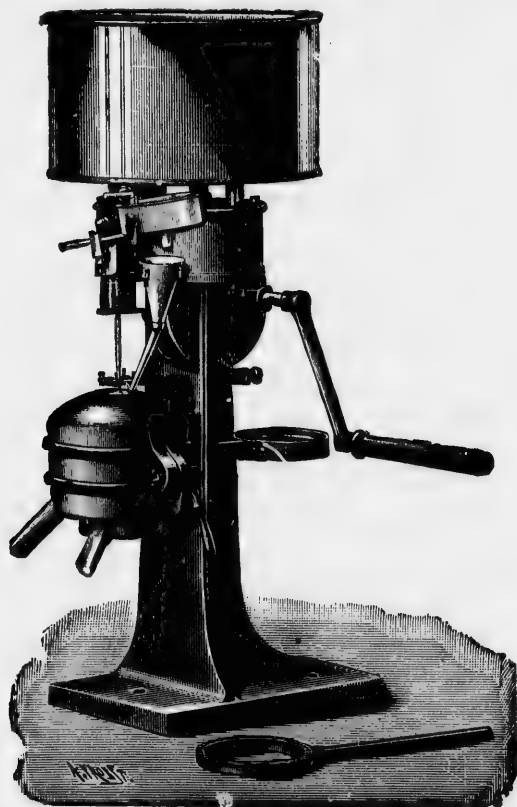
The specific gravity of fresh milk varies from about 1.030 to about 1.036, according to the amount and composition of the solids. The solids, not fat, tend to increase the specific gravity, while the fat tends to diminish it; for example, milk containing a large percentage of fat will have a low specific gravity, while the specific gravity of skim-milk will be high. When milk is cold it has a greater specific gravity than when it is warm. The best definition of specific gravity is, in a simple word, the density. The term density is now more frequently used by chemists than the term specific gravity, so for clearness we will use the term density here. Hence, when milk is cold, its density is greater than when it is warm, or, perhaps, a better word (meaning the same), it is thicker. Such is milk in a few sentences, as the butter-maker should know it, to be successful in his (or her) operations.

CREAMING.

The globules of fat above mentioned are what constitutes the cream of the milk, and to get them all out is the work of the butter-maker. We have seen that they are too small to be strained out with the finest sieve. There are two methods of taking them out, namely, the natural method and the mechanical method. The natural method consists of allowing the fat globules to rise to the top of the milk by the power of gravitation. If the milk be left at rest, a large portion of them will rise to the top because they are lighter than the liquid in which they float. The heavier parts of the milk are drawn down by the force of gravitation, and as the serum of the milk, composed of water, casein, sugar, albumen and ash, move downwards, it displaces the fat globules and forces them towards the top. The mechanical method is that of centrifugal force, which

THE "ALEXANDRA" AND "MELOTTE" ARE LEADERS.

attains a like result. The centrifugal force is applied by means of a machine known as the cream separator. The important part of this machine is the bowl or cylinder which revolves



"Melotte" Cream Separator.

very rapidly, the heavier parts of the milk will be forced outwards against its resisting side or inner surface with a sufficient pressure to push the lighter parts, the fat globules, towards the centre of revolution. The continual inflow of milk necessarily

MAKE YOUR WIFE'S WORK EASY.

causes a continual outflow, thus the fat globules are separated from the milk serum. The cream separator is the most efficient method of creaming, because it takes practically all the cream from the milk, so much so that at least twenty-five per cent. more butter can be made from a given quantity of milk by means of creaming with the separator than by any other means of creaming. The following table shows the effect of the different methods of creaming, and proving conclusively the advantages of the separator method of creaming:—

	Separator.	Deep Cans.	Shallow Pans.
Whole milk, per cent. of fat	3.67	3.67	3.67
Skim milk, per cent. of fat	0.08	0.52	0.48
Buttermilk, per cent. of fat	0.18	0.24	0.22
Unrecovered, per cent. of fat	2.29	12.05	11.63
Pounds of butter, per 100 lbs. of fat	113.52	104.77	105.57
Pounds of milk per lb. of butter	24.06	26.11	25.89
Proportion	108.52	100.00	100.85

The above is the result of an exhaustive experiment carried on at Ottawa, at the Experimental Farm there, covering a period of one year, from January to December.

When the natural, or setting, method is practiced, great care must be exercised in order to force all the fat globules possible to the top of the milk. The practice of leaving the milk setting in the milking pails for even the shortest time after it has been drawn from the cows, is a bad practice, and certainly means a great loss to the dairyman. The milk should be thoroughly strained and set immediately after it is milked, while it is warm from the cow. The temperature of setting should at least be to 90 degrees Fah., and a few degrees above that temperature will be all the better. The warm milk should be set in ice water, 40 degrees Fah., the colder the better to give the best results.

EFFECT OF TEMPERATURE.

If milk in a deep setting pail be left at a temperature of 60 degrees Fah., it would take the small fat globules from two to

four days to get to the top of the milk, at the rate at which they would move, because, as we said before, the milk is thicker when cold than when it is warm. Milk at a temperature between 90 degrees and 95 degrees Fah. is slightly enlarged in bulk because it is thinner, and by putting it into deep setting cans at a temperature of from 90 degrees to 95 degrees Fah., the advantage of a falling temperature from 90 or 95 degrees Fah. to 40 degrees Fah. may be gained. That treatment will cause a more rapid upward movement of the fat globules, hence a smaller percentage of fat would be left in the skim-milk. Should the milk become cooled before setting, it should be warmed at time of setting to the temperature described above. This may be done by the addition of warm water at 120 degrees Fah., adding about ten per cent. The addition of warm water is a two-fold benefit; it both warms the milk and makes it thinner thereby hastening the rising of the cream. Milk treated as described above should throw most of its cream to the top in from fifteen to twenty hours. There are two ways of removing the cream from the milk, namely, drawing the milk from the bottom by means of a faucet in the can, and with a conical-shaped dipper; the latter is to be preferred, as it is cleaner, as the sediment always found at the bottom of the can is avoided.

CREAMING WITH THE SEPARATOR.

When the separator is used for producing the cream, the milk should be strained and run through the separator as soon as it is drawn from the cows. The milk must be warm when separated, in order to gain the best results. The separator should be placed where the atmosphere is pure. When first starting the separator, see that it is perfectly level, also that all bearings are clean, and all well oiled. In starting to separate, first get up the required speed, then fill the bowl with warm water. When the water begins to run from the milk spout of the separator, start the flow of milk and keep it steady while the separator is running. Keep the speed of the separator always up and steady. When finished separating, after all the milk is run through, fill the bowl again with warm water to

clean out all the cream and milk. The separator must be cleaned every time immediately after using, as is the case with all dairy utensils. The many advantages that the separator has over any other system of creaming makes it a most desirable dairy utensil for the butter-maker to possess, and the modern butter-maker cannot, in justice to himself, do without it. Among some of its many advantages are more and better butter, which is the principal; the skim-milk is perfectly sweet



"Alexandra" Cream Separators, Nos. 12, 11½ and 8.

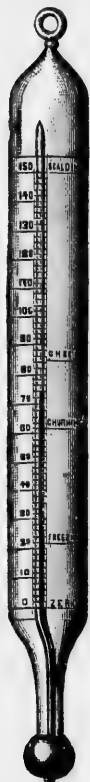
and much more valuable for feeding young stock than sour cold milk. Fewer utensils to keep clean, and less work for the operator, consequently less labor and more money.

DAIRY UTENSILS.

The most essential dairy utensils that should invariably be used on the farm for making fine butter are: 1st, the centrifugal cream separator, Melotte or Alexandra (the best that can be got). In order to procure the best, have the agent of each machine that is in the market set their respective machines up at your farm, and let them compete for your patronage. Take

OR "MELOTTE" CREAM SEPARATOR.

the machine that does the best work. In this way there will be no difficulty in getting the best possible separator. 2nd, the smallest instrument used in dairy work, but the one the butter-maker cannot possibly be successful without, i. e., the thermometer. Be sure to get one that is correct to a half-degree in its reading. Never attempt to make a batch of butter without a thermometer; it is a never-failing guide all through the process of butter making, from the separating of the cream to the working of the butter, and even in packing it should be used. Many persons (wise in their own conceit) say they can tell the temperature of any liquid by putting their finger into it. This, of course, is not so; the finger is not sensitive enough to tell the temperature. Even the most experienced butter-makers cannot tell temperature by the feeling of the finger. True, there is a good deal of butter made without the use of the thermometer to guide the operator, but where there is one case of success there are ten cases not successful. The thermometer must be in every dairy, in order to ensure success. 3rd, the cream ripening can. This should be a double can, having a space of about two inches between the outer and inner can. A cream can constructed in this way will enable the butter-maker to control all temperatures required for ripening the cream. The can should have two covers, one fitting the inner can and one fitting the outer can. 4th, the revolving churn. The churns vary in size all the way from No. 0 to 8, holding from 7 to 80 gallons. This churn should be sufficiently large, to hold the cream from the herd at one churning. For a herd of ten cows, a No 4 churn would be sufficiently large, and for a herd of fifty cows, the largest hand churn should be used. 5th, the hand table lever butter-worker. This utensil runs in numbers the same as the churns. 6th, the hand butter-printer of one pound capacity. This utensil should be plain, without any frills or crimpings. The print of butter when formed should be smooth on the surface



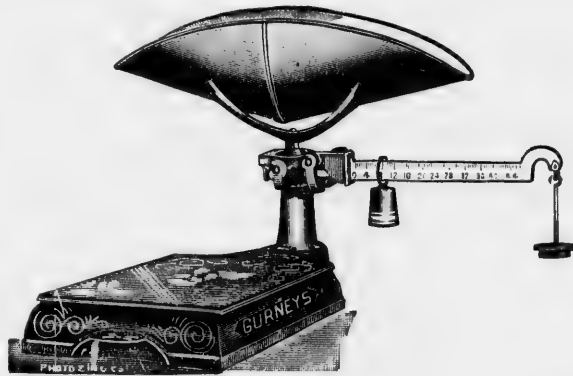
DAIRY
THERMOMETER.

print of butter when formed should be smooth on the surface



Dairy Churn.

and square on the corners. 7th, the best quality of parchment paper, cut in sheets 8x11 inches., with the name of the farm, and trade mark, if desired, printed in indelible ink in the centre



Counter Scale.

of the sheet. The other utensils required may be enumerated as the cream strainer, the buttermilk strainer, brushes for scrubbing—and last, but by no means least, a small set of scales and

"MELOTTE" CREAM SEPARATORS

the Babcock milk tester. This machine should be in every dairy. It will work wonders for the dairyman. It will tell him what cows are giving a profit and what ones are being kept at a loss to his pocket. It also shows how much butter fat at 20c. a pound is lost in the skim-milk and buttermilk. In short, it will put the dairymen of the West on a basis of sound business principles, and show them how they can make dairying pay and where their present losses now occur.

The above mentioned utensils should not cost the farmer over \$75.00 to \$135.00, at the outside figures, according to the size of his herd, and the quality of the butter that would be made by the employment of this plant would ensure a sufficient advanced price in at least two years' time to pay the cost.

TREATMENT OF CREAM.

After the separating is done the cream should be cooled as quickly as possible to a temperature of 40 degrees Fah. This



Cream Cooler.

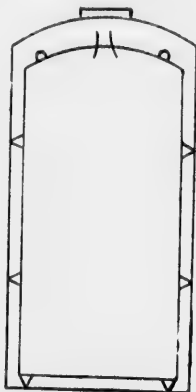
gives the butter a waxy, firm texture, which is very desirable. The thermometer should be held continuously in the cream while it is cooling. The cooling may be done by putting the

HAVE STOOD MANY TESTS,

can into a tub containing ice cold water, and stir gently until 40 degrees Fah. is reached. Ice in Manitoba is always a number one hard crop, and should be secured by every dairyman in the province.

SETTING THE CREAM.

When sufficient cream has been collected for a churning, it is put through the process of what is called setting, for ripening or souring. This process consists of heating the cream to a temperature of from 60 degrees Fah. to 70 degrees Fah., ac-



This cut represents the interior of a cream can. The inner can may be lifted out so that both cans may be properly cleaned.

cording to the temperature of the room that the cream is kept in. If the temperature of the room can be kept steady at 60 degrees Fah., the cream need not be heated above 60, but if the room is such that the temperature falls during the setting time, the cream should be heated to 70 degrees. When the cream is heated to the desired temperature, if it is sweet, there should be added to it 5 per cent. of fermentation starter. This is used for the purpose of starting the cream to ripen or sour. There are many fermentation starters now in use, and they can be bought at different prices, but the most practical starter to use is the buttermilk from day to day, if

AND PROVE! THEMSELVES SUPERIOR MACHINES.

the buttermilk is pure and free from any odors foreign to itself. However, should the buttermilk at any time become tainted, it should not be used in the cream, as it will affect the flavor of the butter, and thereby cause havoc in the dairy. In case of the buttermilk becoming tainted, other milk or buttermilk of good flavor should be procured and used as a starter in the cream. Add 5 per cent. to the cream. What is meant by 5 per cent. is 5 lbs. of starter to each 100 lbs. of cream, or in that proportion. Should the cream be slightly sour when heated to the setting temperature, 60 to 70 deg. Fah., as described above, no starter need be added, as the cream is ready for churning when slightly sour. Cream should have the consistency of white paint when the paint is ready for use, and it should not be any thicker. Very thick cream is hard to churn and a portion of it will adhere to the sides of the churn and is washed out with the buttermilk, causing considerable loss of butter fat.

The cream should be all ripened alike (souring is called ripening), so that it will all churn alike. No sweet cream should be added to the cream in the ripening can that is ready for churning, within 12 hours before churning time. Sour cream churns, if properly ripened, in about 30 minutes, while it takes usually one hour and over to churn sweet cream, and sweet cream must be put into the churn at 40 degrees Fah., while sour cream should be put into the churn at 56 to 58 degrees Fah. Hence, if sour and sweet cream be mixed and churned immediately, the sour portions of the churning will churn in less than half the time that the sweet portions will churn, therefore the butter fat contained in the sweet portions of the cream would remain largely in the form of cream in the buttermilk, while the butter fat contained in the sour portions would be churned into butter, consequently the large portion of the butter fat from the sweet cream would be lost in the buttermilk.

The cream should be stirred gently occasionally during the setting period, so that the whole bulk will be evenly ripened. Twelve hours should be sufficient time in which to ripen the cream to the proper conditions for churning. Cream should not be held too long in order to get a big churning. It

ARE YOU LOSING MONEY?

is better by far to make small churnings and churn often, as the flavor is very apt to become impaired by long standing.

The cream ripening can should always be kept carefully covered when containing cream. Remove the covers only when stirring the cream, or in adding cream for the churning, and cover immediately afterwards. When there is no cream in the can, it should be thoroughly cleaned and set outside in the open air, so that it may get a thorough airing and be pure and sweet for the next collection.

PREPARING CREAM FOR CHURNING.

The temperature of the cream, when it is ready to churn, should be from 56 to 58 degrees Fah., but never above 58 degrees, during the spring, summer and autumn months, and from 60 degrees Fah., to 62 degrees Fah., but never above 62 degrees, for the winter months. It is imperative that a thermometer should be used to reveal the temperature. There are thousands of pounds of butter spoiled in Canada annually from lack of attention to temperature in the process of butter-making on the farm. Making butter without a correct thermometer is like making hay without sunshine—it cannot be done with any degree of success. If cream is too cold to churn, i. e., below 56 degrees Fah., it may be warmed by placing the cream can in a kettle of hot water and gently stir the cream until the proper temperature is reached, and if too warm, it may be cooled by the same method, using ice cold water. The temperature should be exact, and should not be churned below the temperature given for summer months, nor above the temperature given for the winter months, namely, from 56 to 58 degrees Fahr. for summer and 60 to 62 for winter months.

PREPARING THE CHURN.

Before any cream is put into the churn it should be scalded thoroughly inside with pure boiling water. Pour the boiling water into the churn and put the lid on and revolve the churn slowly for two or three revolutions, and then let the steam out of it by pulling the buttermilk plug out. Repeat this

YOU ARE IF YOU ARE NOT USING

two or three times until the steam ceases to escape freely; then revolve the churn rapidly for a half-dozen or so times. Then draw off the hot water, and add a pailful or two of cold water



Butter Spade.

to cool off the churn. The churn should be thoroughly cooled to prevent any of the cream from adhering to the sides. All wooden utensils should be treated in this way before they are brought in contact with the butter. The hot water for scalding cannot be too hot, nor can the cold water for cooling be too cold.

CHURNING.

When the cream is put into the churn, it should always be



Cream Strainer.

strained through a cream strainer made for the purpose, having a perforated bottom. The strainer should be placed in the mouth of the churn and the cream poured into it. The

AN "ALEXANDRA" OR "MELOTTE"

straining of the cream breaks up any coagulated casein that may be in it, and largely overcomes the often heard of difficulty of mottled or spotted butter, or white specks in the butter. Again, by straining, the cream is rendered of a uniform thickness, and will churn much easier than it would if it were not strained.

When the cream is all in the churn, the color may be added, if necessary. The color of the butter should not be too high; about a good clear straw color is the most desired by nearly all the markets of the world at the present time. Butter color does not improve the butter in any way except in appearance; therefore use only what is necessary to give the butter the desired tint, usually about $\frac{3}{4}$ to $1\frac{1}{2}$ drachms of color to the cream of each 100 pounds of milk is sufficient to give the proper tint. Always add the color, if using it, before the churning has commenced; never after, even if the churn has made but a few revolutions. The butter color acts only upon the fat globules, and even if the churn has been revolving but a short time, the globules are to a certain degree formed, and the color, acting directly upon them, causes high colored spots in the butter, and the result is mottled butter. The best butter color procurable should always be used, and never a poor, cheap color. The flavor of butter is often injured by the use of cheap, spurious color. Never use old color; it should always be fresh, and of a slight nutty flavor. It should be free from any sediment and have a glossy appearance.

STARTING THE CHURN.

The manner of running the churn is of great importance, as on it depends, to a great extent, the quality of the finished product. After the churn has made a few revolutions, it should be stopped, and the buttermilk plug removed, to allow the gas to escape, otherwise the churn would burst from the pressure of gas or air. This should be repeated two or three times at the beginning. Afterwards the churn should be run steady and continuously, making about 65 revolutions per minute, until the butter has formed in small granules about the size of a clover seed; then the temperature of the contents of the churn should

CREAM SEPARATOR.

be taken, and if it is found to be above 58 degrees Fah., it should be cooled down by dashing ice cold water into the churn, to between 56 degrees and 58 degrees Fah., and the churning resumed until the granules are about the size of wheat kernels, *and then stop churning.* The butter should float well up on the buttermilk when the churning is finished. Never churn butter past the granular stage—*this is very important*, for when the grain is broken the butter is greasy, which is very undesirable. At this stage, the buttermilk should be drawn off, being strained through a hair sieve, and the butter allowed to drain for about fifteen minutes.

WASHING THE BUTTER.

When the buttermilk is thoroughly drained off, water at 54 degrees Fah., should be added to the churn, equal in quantity to the buttermilk, just run off, the churn lid fastened on and the churn revolved rapidly for about a dozen revolutions. Then the water removed and the same quantity of cold water at about 45 degrees to 48 degrees Fah. should be poured into the churn and the rapid revolving repeated as before. Two washings are sufficient to remove all the buttermilk from the butter. After the water is thoroughly drained off, the butter should be removed to the butter worker for salting.

WASHING BUTTER—DANISH METHOD.

In Denmark, the butter is dipped from the buttermilk, while it is in the churn, by using a hair sieve, dipping the butter on to the butter-worker, and pouring water over it, and washing the buttermilk out. This is a very good method, and may be adopted in cases of scarcity of pure cold water, as it only requires about one-third of the amount of water as by the former method.

SALTING BUTTER.

When butter is removed from the churn, it should be accurately weighed before placing it on the butter worker for salting, so that the proper amount of salt required may be ascertained.

The quantity of salt to be used depends altogether on the requirements of the market on which the product is to be offered for sale. The consumers who buy butter on any market must have their taste in this, satisfied as in all other respects; therefore, it is absolutely necessary for the farmers who make butter to become thoroughly acquainted with the needs of their customers, in order to please them, and thereby secure a ready and regular market at paying prices.

The requirement of our Canadian markets is about three-quarters to one ounce of salt to each pound of butter taken from the churn. The butter is now in the granular stage, and the grain must be preserved. This is best done by little working. After weighing the butter, it is placed on the butter worker, and the salt should be sprinkled on it in such manner as to distribute it evenly over the mass of butter, after which the preliminary working may be commenced. This working should be very slight, just enough to thoroughly distribute the salt through the butter. Turning the butter over on the worker two or three times is sufficient to get the salt properly mixed through it. Then the butter should be put in a tub or tray and put into a cool place, having a temperature of at least as low as 50 degrees Fah., and left for four or five hours. This is done to allow the salt to dissolve thoroughly in the butter. Pure salt will all dissolve, but it is impossible to force it into butter by working.

WORKING BUTTER.

Butter should always be worked twice, but should not be overworked. The first working is done when the butter is salted, as described above, and the second working is done after the butter has stood for four or five hours after salting. When brought to the worker for the second time, the butter should be worked just enough to make the color uniform. Great care must be exercised in the working of butter, so as not to destroy the grain. When it is worked past the granular stage, its body or texture is destroyed, and the butter will be greasy, and its value as butter will be at least two or three cents per pound

CREAM SEPARATOR

less than butter properly worked, and the grain preserved. Butter that has a greasy texture will not keep nearly so long as butter that has a granular, firm texture. The working should always be done by pressure and never by friction; that is to say, the bar of the worker should be pressed into the butter and should never be rubbed over the surface of it. The mass of butter should be worked evenly and uniformly so that the color will be uniform and the body firm. The best guide the butter-maker has to know when the butter is worked enough is to cut through it with the butter spade, and if the color is even and



Lever Butter Worker.

the body close and firm, with no white streaks through it, it is worked enough. Butter requires very little working to accomplish this result. Good butter when broken apart will show the grain like a piece of broken steel, and this should always be the case with all butter. The butter-maker must exercise great care at this point, in working butter two or three strokes too many with the lever of the worker often will break the grain.

The temperature of the butter, when being worked, should not be above 55 degrees Fah., and if at 50 it will be all the better. At this temperature the grain of the butter is less apt to be injured by excessive working. Butter should be thoroughly

cooled before working. This is very important. The least attempt at working it while it is warm will at once destroy the grain.

SALT.

The purest and best quality only should be used for salting butter. Farmers should insist upon having nothing but the best brand of salt manufactured. There are thousands of pounds of butter spoiled annually by the use of impure, cheap salt. It is far better, and more profitable in the end, to buy the best, even if it costs double the price of poor, impure salt, which is so often placed upon the market by unscrupulous manufacturers. Our own Canadian salt is fully as good as any salt manufactured in the world, but the best brands only should be purchased for butter-making purposes. Every brand of salt should be tested before it is used. There are different tests that may be employed to determine its purity. The most practicable test for the "farm butter-maker" to go by is water. Dissolve a few ounces of salt in a quart of pure water, thoroughly mix it by shaking the salt and water vigorously for a moment at intervals; then let it stand for an hour. If there is no precipitate at the bottom of the vessel it is a pretty good indication that the salt is pure. Should there be any precipitate of a hard, insoluble nature, the salt is impure, and should be rejected, no matter how low the price may be. Poor quality salt is one of the greatest causes of poor flavored butter; therefore, use the best quality of salt and the better flavor will the butter have, and a better price will be obtained.

PACKING BUTTER.

After the butter is properly worked, it should be packed for market as quickly as possible. In packing butter, it should be done with a view to tidiness in the very greatest degree. A slovenly package is an abomination to any market, and is largely the cause of a glutted market. People do not want to buy butter when it is put up in a dirty or ill-made package. There are different ways of packing butter, but in every case tidiness

SEVEN DOLLARS PER COW PER YEAR.

must be the watchword. The taste and fancies of the buyer must be studied and catered to in every case to ensure a ready market. Some people may want butter put up in tubs and some in other ways, and to establish our "Farm butter trade," the people who buy butter must get it as they want it. Dairy butter has been placed in lard and candy pails and sent to market. This is a very careless practice, and it seems strange that farm butter-makers endowed with ordinary common sense would think of doing such a thing. These pails may have been used with a view to cheapness, but really they are very expensive packages when the butter spoils in them, as it invariably does.

THE PACKAGE.

For the farm butter package the tub and the square pound print is the most desired at present. In packing butter into a tub, the tub should be lined with good quality of parchment paper. This paper does not cost much, and will pay for itself in extra price of butter when the buyers know that the tubs are



Butter Tub.

lined. A parchment paper lined tub will preserve the quality of the butter fully fifty per cent. better than a tub that is not lined, and the butter will be worth from one to two cents per lb. more. The best parchment paper to use is that which weighs 50 pounds to the ream. Always insist upon having that, and buy no other; light, thin paper is of very little use.

DO NOT PUT SEPARATOR BOWLS

TREATMENT OF TUBS.

Before using the tubs they should be soaked in strong brine for 24 hours, after which they should be thoroughly scalded and well brushed with a scrubbing brush, then rinsed with pure cold water.

LINING THE PACKAGE.

In placing the lining of parchment paper into the tub, first put a circular piece in the bottom of the tub, just the size to fit; then put the side lining in, allowing half an inch to lap on the bottom circle, and allow half an inch to lap over the top of the butter when the tub is full. The side lining and circles can be bought ready cut to fit any sized tub.

PACKING.

Great care must be exercised in packing butter to have all parts of the tub filled, so that no air spaces will be left in the sides or bottom of the tubs. The first layer of butter put in the tub is of the most importance. A butter-packer made for the purpose should be used, as it is impossible to pack butter properly without it. Have the first layer thoroughly packed in, and then the tub may be easily filled; it is better to use the butter-packer more on the sides of the butter than in the centre. All parts of the butter should be kept level, however, until the tub is full. Fill the package up to within about a quarter of an inch of the top, putting the butter in at the rate of two or three pounds at a time, and packing each layer firmly. Then smooth the butter off on the top by cutting with a knife. Now lap the side lining down and place a parchment circle, to fit, on the top of the butter; make a paste of salt and water and fill the remaining quarter of an inch of the tub with salt paste; fasten the cover on, and the butter is ready for market.

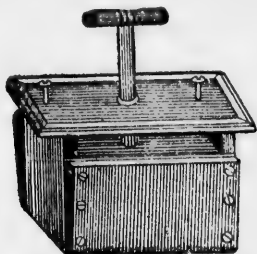


Butter
Packer.

ON THE STOVE TO DRY.

THE SQUARE PRINT.

For immediate use, the square pound brick of butter is very desirable. This print should be plain and smooth, having no carvings or flourishes about it. The butter should be wrapped in parchment paper. The paper can be purchased cut ready



Butter Printer, One Pound.

for use; the size should be 8x11 inches. These sheets of paper may be printed with indelible ink, so that they can be put into water without the ink running. The printing should read something like the following:—

FRESH MADE DAIRY BUTTER.

Spring Bank Farm,

J. C. Thompson,

P. O. Address ———.

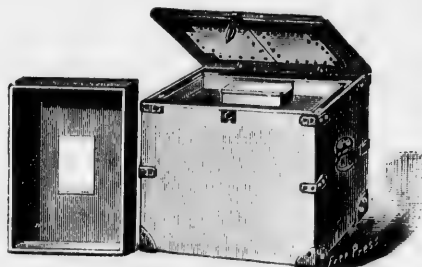
In printing, the print is pushed down into the butter while it is on the butter-worker. When the printer is full, the butter is cut off at the bottom of the printer with the butter spade, so as to leave the butter smooth. The paper, which is soaked in cold water, is taken out and laid on the worker, and the printer placed on the paper just where the printing comes, and the butter is pushed out of the printer by pressing the stem of the printer; then the paper is wrapped smoothly over the butter and folded neatly at the ends. Here we have a clean, tidy, attractive package, which will find a ready market

TO CLEAN SEPARATOR BOWLS

if shipped fresh. The prints should always weigh a full pound; the printer can be adjusted so as to make a full pound or a little over, and it is better to have it a little over the 16-ounce mark than to be light in weight.

MARKETING BUTTER.

It is not advisable to hold butter over for any length of time. It should be sold regularly as fast as it is made at the then current market price. Let the consumers have the butter fresh, and they will use more of it; in the long run, the price that will be realized, taking one year with another, will be fully as great when the butter is disposed of regularly as when it is held until it becomes stale, and with regular sales



Butter Shipping Box.

there will always be the advantage of a clean market. Butter in prints cannot be held for a long time; it must be sold as fast as made. If butter is to be held in tubs at the farm, it should be brined every week. This is done by making a strong brine of salt and pure cold water, strong enough to hold up a sound egg. Pour in each tub all the brine it will hold. Usually tubs leak more or less, so it is necessary that the butter should be looked after each week, and the tub kept full of fresh-made brine while it is being stored.

GENERAL HINTS TO FARM BUTTER-MAKERS.

1st. Make sure that every cow on the farm is paying her way and giving you a profit, instead of living on you at your expense. Remember, that it costs you \$30 per year to keep a

FIRST USE TEPID WATER TO SOAK,

cow, and if she is not giving you more than that in butter every year, she is running you into debt to just the extent of what she gives you less than \$30 worth. Weed out the poor ones and put them where nature intended them—on the butcher's block. Keep those that are profitable only; then feed them and care for them to do business.

2nd. Get a Babcock milk tester and test every cow thoroughly. No dairy farmer can afford to be without one. They will reveal many things that he should know in connection with his business.

3rd. Get an Alexandra or Melotte cream separator and get all the fat out of the milk. Never lose sight of the fact that fat left in skim-milk is too expensive a food for calves and pigs, and that you cannot afford to do business in that way. Butter fat is worth to you just what you can sell it for in the market, and if you are feeding it by leaving it in the skim-milk, it is just the same as buying butter on the market and feeding it. No intelligent man would do that. So why do just as bad by leaving fat in the skim-milk?

4th. Look well to temperatures in making butter at all times, from skimming the milk to the packing of the butter. Never attempt to work without a thermometer. *This is very important.*

5th. Be sure to ripen the cream properly. Don't mix any cream with that which is intended for churning to within at least 12 hours before churning. Don't forget that sweet and sour cream does not churn alike, and if mixed just at churning time the butter contained in the sweet cream would go out in the buttermilk when the sour cream portions would be finished churning. Don't fail to stir the cream gently at intervals while ripening, so that it will all ripen uniformly.

6th. Don't forget that the temperature of the cream at churning should be 56 to 58 degrees Fah. in summer and 60 to 62 degrees in winter. The best churning results will be had at these respective temperatures.

THEN USE WATER AS HOT

7th. Thoroughly scald the churn and all other utensils, and then thoroughly cool them before the cream is brought in contact with them. Always strain the cream into the churn through a perforated strainer.

8th. Don't churn the butter past the granular stage. Use every means to preserve the grain of the butter.

9th. Wash the butter just enough to get all the buttermilk out of it; that is sufficient.

10th. Always salt the butter as soon as it has thoroughly drained after washing, and set it away in a cool place for at least 4 or 5 hours to allow the salt to thoroughly dissolve, after which work it just enough to make the color uniform. The best butter is made where the least working is done. Never use more than one ounce of salt per pound of butter, unless by special order from a customer. Study the requirements of your customers in this. Always use the best brand of salt.

11th. Give good weight in packing or printing. It is better to give a pound than to have a pound short.

12th. Always pack butter with a view to tidiness in the very highest degree. No matter what form of package is used, specially study the requirements of the markets for packages.

13th. Always market your butter regularly at current market prices. Give your customers pure, sweet, fresh butter, and your reputation as a good butter-maker will soon be established. When your butter is held until it is old and stale, it is not wanted, and your reputation suffers as well as your pocket.

14th. Practice cleanliness in every detail. Good butter cannot be made unless cleanliness is the watchword.

Rinse well every article of dairy utensils that comes in contact with milk or cream, with cold or tepid water first; then wash with as hot water as the hand can bear. Frequently use pearline or salt in washing them. And last, thoroughly scald with boiling water and place in the open air until required for use again. Look well to the seams of the tinware that no filth collects there.

Scald the churn, butter-worker and all wooden utensils with boiling water before and after using them, and thoroughly cool them with cold water. Always use a brush to scrub them with.

Brush the cow's udder thoroughly before milking. Milk with clean, dry hands. Always wear clean clothing when milking. Ever remember that nothing can be pure and wholesome without cleanliness.

15th. Never allow anything to go half done. Anything in the dairy business, as in anything else that is worth doing, is worth doing well, for therein the profit lies.



TO WASH, AND THEN USE

Hints on Production of Cream at the Farm for Use in the Creameries.

The manufacture of creamery butter has become one of the staple industries of Canada, and is increasing in money value year by year. In order to continue with the greatest degree of success, we must begin at the beginning, that is to say, begin at the farm, and give the matter a thorough study from the producing of the cream at the farm to the making of the butter at the creameries. We have thoroughly skilled butter makers to manufacture the butter at the creameries, but the work of producing the cream falls to the farmers. The cream gathering system is the only one we can adopt for the successful operation of creameries in some of the Provinces of Canada, such as Manitoba and the Northwest Territories, until such time as the population of these Provinces are much greater than what it is at present. Some districts are so sparsely settled that the distances the milk must be hauled makes it impracticable to operate a creamery on the system known as the "central separator plan." It costs so much money to haul the milk owing to distance that would have to be covered in order to get a sufficient supply to make a creamery pay, that the milk-drawing alone would eat up even more than the profits. The cream only, under present circumstances, can be taken to the creamery. Larger areas of country can be gone over, and the cost of hauling be greatly reduced. Hence the production of cream at the farm is the first important step in the manufacture of good creamery butter.

CARE OF COWS.

The first matter to be considered in the production of cream is proper care of the cows giving the milk. They must be

BOILING WATER TO SCALD AND DRY.

liberally and regularly fed at all times, and be treated with every kindness by every individual that comes in contact with them. A milch cow is more or less a nervous animal. The greater the milk-producing capacity of the cow, the more nervous will she be, and if she is treated roughly she will not give as much milk nor milk of as good quality as if she was treated kindly.

Milch cows should be housed in winter, and in fact any time of the year when the weather is cold, in a manner that would give them the most possible comfort at all times.

FEED.

In summer, cows should have good pasture, of a variety of succulent grasses, a sufficient acreage of vetches or green oats; and peas should always be sown, with which to feed the cows when the pasture becomes dry and short. The cows should at all times have plenty to eat and not be compelled to travel far for it: the more they have to travel in hot weather to get what they require to eat the less milk they will give, and the poorer will be the quality; consequently, the less profit will be realized from the proceeds of the dairy cow. The flow of milk should be kept up to its fullest capacity each month, in order to realize the greatest benefit, and the largest profits from the dairy herd.

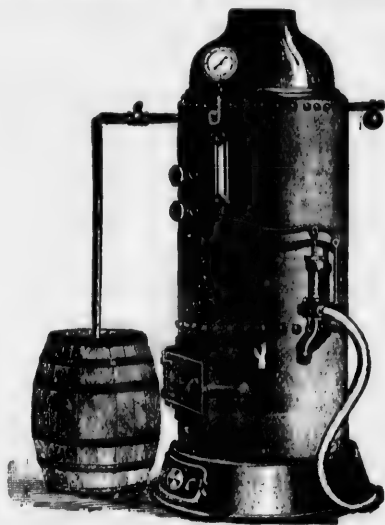
The soiling crop can be cut in the green state two or three times during the season, furnishing a nutritious and succulent fodder during the whole of the dry season. This green fodder will help very materially in keeping up the flow of milk.

WINTER FEEDING.

Winter feeding of the dairy herd is just as important as summer feeding to make dairying profitable.

Sow plenty of coarse grains for winter fodder, cut in the green stage, that is just before the grain begins to ripen, and cure thoroughly; makes far more valuable fodder for winter than prairie hay. Make every provision to winter the cows

well, so that when the spring time comes they will be prepared to go ahead at once and do a profitable business instead of be-



Feed Cooker.

ing so thin and weak, that they will have to board at your expense for half the summer to gain strength and flesh before they are able to do the work required of them.

WATER.

An abundant supply of pure water should be kept within easy reach of the cows at all times. When cows are scantily supplied with water, they will not give as much milk or milk of as good quality. They should never be permitted to drink water out of stagnant pools; such practice causes very serious trouble in the manufacture of butter. Impure water given to the cows produces impure milk, and is one of the causes of bad flavored butter. It is impossible to make a fine quality of butter from the cream of such milk.

SALT.

Cows should be allowed access to salt every day. Have the salt in the pasture or milking yards where they can get it when-

YOU ARE IF YOU ARE NOT USING

ever they need it. They will regulate their requirements much better than you can if they are allowed to do so; a cow will not eat more salt than is good for her if she gets it regularly.

MILKING.

The milking should be done regularly at the same corresponding hour night and morning. The milking should be done with dry hands, this is very important; it is more cleanly and leaves the milk in a more wholesome condition for the manufacture of fine butter.

The atmosphere of the stables should be pure to prevent any contamination from that source. The milk should be strained immediately after it is drawn from the cows, to remove any impurities, stable dust, etc. The straining should be done with a double straining cloth. Cheese cloth makes the most desirable strainers; it is inexpensive and can be easily renewed when it is worn out. For simplicity and convenience the strainer cloth may be fastened over the top of the can with clothes pins. The strainer should be removed and thoroughly washed as soon as the straining is done.

CARE OF DAIRY UTENSILS.

All utensils that are used in connection with dairy work should be at all times properly cleaned, pure and sweet. *This is very important*, as the least filth about them will contaminate the milk and cream, and bad results will follow. All utensils should be of tin, *never* of wood. It is utterly impossible to keep wooden pails, etc., clean when they are used for milk.

The best way to cleanse the utensils is to use cold or tepid water first and give them a good rinsing; then use as hot water as the hand can bear to wash them, using a little pearline occasionally in the wash water; after a thorough washing they should be scalded well with boiling water and then put outside to become thoroughly aired. In this way the milk vessels can be kept perfectly clean, pure and sweet.

CARE OF CREAM.

After the milk has been carefully separated, the cream should be submerged in cold water in a cream can specially made for the purpose, keeping the temperature down to at least 50 degrees Fah., and lower if possible, stirring well but gently, each time fresh cream is added. If the cream is cared for in this way there will be no complaints about sour cream, and the patron will have done his duty in supplying the butter-maker with the raw material in good condition to make gilt-edge butter. Cream should not be set in open vessels, of any kind, in cellars, pantries or any other places where the atmosphere is not perfectly pure, nor where the temperature is found to be above 50 degrees, as it is sure to become sour and may be in churning condition before reaching the creamery which would be very undesirable. All cream vessels should have air-tight covers, and all seams in all milk vessels should be filled with solder, to prevent an accumulation of dirt which will taint the milk and cream.

THE CREAM GATHERER.

He should be clean, obliging and honest. He should keep the cream cans or tanks perfectly clean and in the best condition possible for the reception of the cream, and should allow the cans or tanks to get plenty of fresh air at night or at any time when they are under his care. The wagons should be kept thoroughly clean. The managers of the creameries should see that these matters are attended to. The cream gatherer should be very careful about measuring, mixing and sampling the cream, as carelessness on his part may cause a shortage of butter and misunderstanding may arise between the patrons and butter-maker which are unnecessary and may be avoided by the collector doing his duty. The cream should be poured gently from one vessel to another about three times, so as to make it uniform before taking the sample into the test tube for testing. Measure carefully and accurately and give each patron credit for the full number of inches of cream. Give a correct statement of all cream received from each patron and the date to the butter-maker at the creamery.

CREAM SEPARATOR.

The butter-maker at each creamery should take steps to have all cream delivered at a temperature not above 55 degrees. The cans or tanks should be jacketed so that there will be a dead air space around the cream so as to protect it from the heat. The cream wagons should be covered with a canopy cover to protect the cans or tanks from the sun and rain.

If the patrons of each creamery will do as directed in the care of cream, it can be delivered much cooler than is usually done, and a superior quality of butter can be manufactured and consequently a better price will be obtained.

HAULING CREAM BY RAIL.

Where there are no local creameries in a district, cream may be hauled by railway express from a distance of fifty miles with safety, provided the cream is properly cared for, so that it will arrive at the creamery in a sweet condition.

GENERAL HINTS TO DAIRYMEN.

1. Cream from the milk of healthy cows only should be sent to the creamery.
2. The use of a Babcock milk tester would show how the milk is being skimmed. If fat is left in the skim-milk the loss to the dairyman will be large. Butter fat is too expensive to feed to calves and pigs.
3. Milk should be strained and separated immediately after milking before it has time to cool; never allow it to stand around the stable or elsewhere, even until the whole herd is milked; but just as soon as a can of milk is ready it should be separated.
4. Always use a thermometer to ascertain the temperature.
5. Be sure that the thermometer is correct; buy no other.
6. 90 to 95 degrees is the most desirable temperature to have the milk when separating.
7. Tin pails and cans only should be used to handle milk with.

8. Always have an eye to perfect cleanliness, for without cleanliness nothing can be pure.
9. Always brush the cows' udders and teats with a coarse cloth before sitting down to milk. Treat them to this, and they will soon look for it to be done every time.
10. Treat them kindly in every way, and they will pay handsomely for it.
11. Give them plenty of good nutritious succulent food.
12. Give pure clean water to drink.
13. Let the cows have full access to good clean salt every day.
14. See that the cows are housed when the cold nights come. This is important, for there will be a perceptible shortage of butter fat in the milk if the cows have to stand out all night in the cold, damp weather.
15. Get a Babcock milk tester by all means, and test each individual cow, and weed out those that are not paying more than their keep. Every cow should give at least 250 pounds of butter in the year.
16. Allow nothing to go half done; neglect in any part of dairy work is sure to make itself manifest in the quality and price of the product.
17. Practice the foregoing advice every day.



SEPARATOR YOU ARE LEAVING FROM ONE-FIFTH TO ONE-THIRD

Instructions for Using the Babcock Milk Tester.

The Babcock test for fat in milk and cream is becoming more and more in general use in the creameries and cheese factories and among farmers in Eastern Canada and the United States, and by it the dividends are proportioned to the patrons. The tester should have a place in every dairy in Canada. Its use will enable dairymen to test every cow in the herd and weed out the unprofitable ones.

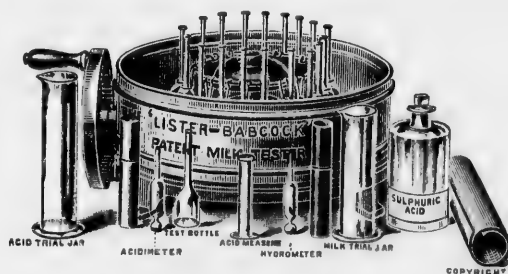
While this test is very simple in its principle, it is not in any sense an automatic machine. It requires very careful attention, and to ensure reliability it must be handled carefully.

MACHINES.

The Babcock machines should be substantially made so as to ensure a steady, even motion and prevent any jarring, which is very wearing and is apt to be dangerous of breaking the bottles and cause damage to both the machine and the operator. A tester should be capable of making from 1,000 to 1,200 revolutions per minute, according to the diameter of the wheel or disc which carries the bottles. A small wheel should make more revolutions than a large one. A wheel or disc measuring from twelve to twenty inches in diameter will be found to be large enough to be practicable, but the size should not be less than twelve inches and need not exceed twenty inches. In machines where the motion is transmitted by friction, the adjustment should be kept tight enough to avoid slipping, as otherwise

OF THE BUTTER FAT IN THE SKIM-MILK.

the speed may be much less than is intended and the result is an imperfect test, as the fat will not be all separated. Machines in which the motion is transmitted by cog wheels are much preferred to friction machines, as there is no lost motion in transmitting.



Babcock Tester (Open.)

The pockets or cups for holding the bottles should be fastened to the wheel or disc by a hinge joint or hook, so that they



Babcock Tester (Closed.)

will hang perpendicular when the machine is at rest, and so that they will be in almost a horizontal position when the machine is in motion. While the bottles are being revolved in a horizontal position the heavy mixture of acid and water will force the

THIS IS WHERE LOSSES IN DAIRYING OCCUR.

light fat towards the neck of the test bottle because the neck is nearer to the centre of the wheel or disc and the heavier liquid will be forced to the bottom of the bottles on account of having a greater centrifugal force.

Boiling water should always be used for filling the bottles after they have been whirled, so as to keep them warm and keep the fat in liquid form, otherwise the fat will become cold and it will be impossible to get a correct reading. Soft water is to be preferred to any other for filling the bottles, as many hard waters contain too much carbonate of lime, so that the carbonic acid, let free by the sulphuric acid, makes considerable foam at the top of the fat column. If soft water cannot be obtained for the test the hard water should be boiled for a short time, or about a half measure of sulphuric acid may be added to each quart of water used for filling the test bottles.

MAKING THE TEST.

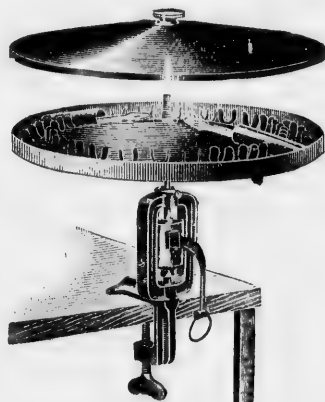
Sampling the Milk.—Every precaution should be taken to have the sample represent exactly the whole bulk from which it is taken. Samples taken from milk fresh from the cow, while still warm, before the cream has had time to rise, are the most satisfactory of any. All milk to be tested should be poured from one vessel to another four or five times before the sample is taken, so as to thoroughly distribute all the fat evenly through the milk. Milk that has stood until the cream has formed in a layer on the top should be poured more times than fresh drawn milk. For convenience sake it is better to have sample tins holding about two gills in which to take the sample from the whole bulk of milk. In this way the operator will be able to duplicate the sample in the bottle should any accident occur in which the bottles should become broken. Should any clots of cream appear on the top of the milk the sample in the tin cup should be heated to about 100° Fah. before sampling into the bottles. The milk should be continuously stirred while it is being heated. With proper care any milk that has not coagulated or that has not become dried may be mixed so that a representative sample may be taken. Milk should not be poured more times than necessary as extended mixing in this way is

GET A BABCOCK MILK TESTER

liable to churn the cream, forming small granules of butter that rise quickly to the surface. When this occurs it is impossible to obtain a perfect sample and it is useless to make a test. It is impossible to sample loppered or thick sour milk, but if milk becomes thick after it has been measured into the test bottle, the results of the test will be the same as it would if the milk was sweet.

SAMPLING MILK FOR COMPOSITE TESTS.

It is generally admitted that the quality as well as the quantity of milk delivered should be considered in making dividends



Lister-Gerber Milk Tester.

in factories where milk is pooled. Many who recognize the justice of the relative value plan hesitate to adopt it on account of the labor and expense involved in making daily tests from each patron's milk. The composite test plan does away with a good deal of the expensive labor. The plan consists in putting a sample from each lot of milk, which is delivered each day into a jar or other suitable vessel that can be sealed air tight, and after a number of days, ascertain the average per cent. of fat in all the milk delivered by the patron for the time considered

by a single test of the composite sample. In order that the composite sample may truly represent the average of all the milk delivered by the patron, the daily sample should be proportional to the amount of milk which is delivered each day. A small conical shaped dipper holding about two ounces of milk and having a long enough handle to reach to the bottom of the weigh can, is as good an instrument as can be found for sampling purposes. The milk in the weigh can should be thoroughly stirred with this dipper before sampling in order to get a proper representative sample of the milk delivered. It is absolutely necessary to keep the milk in the jar from becoming thick in order to get a fair sample for testing. This can be accomplished by the use of one of several chemicals, one of the best of which is corrosive sublimate. This is a deadly poison, and great care should be exercised in using it. It can be procured from any druggist. The proper amount to use in each quart jar of milk to be preserved would be about equal to the size of a pea to each sample added to the jar. As a precaution against the milk in the jar being used by persons not knowing it is poisoned by the corrosive sublimate, it would be well to have your druggist add about one grain of aniline red to five grains of corrosive sublimate to give a distinguishing color.

MIXING THE SAMPLE FOR TESTING.

In mixing the sample for testing, it is absolutely essential that all the cream that may have arisen or adhered to the sides of the jar be thoroughly incorporated in the milk. This can be done by carefully scraping the sides of the jar with a glass rod covered with rubber and then gently shaking the jar with a rotary motion. If the jar is violently shaken up and down the milk becomes filled with air bubbles, which prevents taking an accurate sample.

MEASURING THE MILK INTO THE TEST BOTTLES.

When the milk is sufficiently mixed the milk pipette holding 17.6. c. c. is filled by placing its lower end well down into the sample and sucking at the upper or larger end until the

CREAM SEPARATORS TAKES ALL THE FAT

milk rises above the mark on the stem, then remove the pipette from the mouth and quickly close the upper end of the pipette by firmly pressing the end of the index finger upon it to prevent access of air. In order to easily control the access of air both the finger and the upper end of the pipette should be dry. Let the milk flow down the pipette until the upper surface reaches the mark on the upper stem, then increase the pressure with the finger to stop the flow of the milk. Now place the point of the pipette in the mouth of the test bottle, holding the bottle in a slightly inclined position so that the milk will flow down the side of the neck of the test bottle, leaving a space for the air to escape without clogging the neck, and remove the finger from the top of the pipette, allowing the milk to flow into the bottle. After the pipette has drained out, blow lightly into the upper end to expel the milk held by the capillary attraction at the point. If several samples of the same milk are to be taken for comparison, the milk should be poured about twice from one vessel to another after each sample is taken. Neglect of this precaution will make a perceptible difference in the results of the test through the separation of cream from allowing the milk to stand a moment between taking each sample, especially when the milk examined is rich in butter fat.



Persons who have had no experience in the use of the pipette will do well to practice a short time by measuring water into a test bottle before attempting to make an analysis.

ADDING THE ACID.

After the milk has been properly measured into test bottles, the test should be proceeded with at once, although the samples may be left for a day or two without materially changing results. Samples that have remained in the test bottles for two or three weeks, and

OUT OF THE MILK.

which have become very sour and have commenced to mould before the acid was added, have given the same amount of fat as samples of the same milk tested immediately after being measured should there be occasion to leave the samples for some time before adding the acid and the milk becomes coagulated, the curd should be broken up by shaking the test bottle before the acid is added. It is advisable, however, that the test be proceeded with immediately after the samples are measured.



Acid
Measure.

The volume of commercial sulphuric acid. Specific gravity 1.83, required for a test is approximately the same as that of milk or 17.5 c. c. for the ordinary test. If too little acid is added, the casein is not all held in solution throughout the test and an imperfect separation of the fat results. If too much acid is added the fat itself is attacked and becomes charred and the reading will not be perfectly clear, hence the test will be useless. The acid need not be measured with great accuracy, as small variations will not affect the result. Great care must be exercised in handling the acid to avoid getting any of it upon the skin or clothing, as it is very corrosive. If any should be spilled upon the hands or clothes, it should be washed off immediately, using plenty of water. It will be found advantageous to have a bottle of liquid ammonia near by to apply upon the clothing in case of any acid being spilled upon them, it will prevent the destruction of the fabric and restore the color.

When all the samples of milk to be tested are measured ready for the test, the acid measure is filled to the 17.5. c. c. mark with sulphuric acid, and this is carefully poured into the test bottle containing the milk; the test bottle is held in a slightly inclined position, for reasons given in directions for measuring the milk. The acid, being much heavier than milk, sinks directly to the bottom of the test bottle without mixing with the milk which floats upon it.

When all the acid has been measured into the bottles con-

taining the milk, the bottles should be gently shaken with rotary motion to thoroughly mix the milk and acid together. At first there is a precipitation of curd from the milk, but this rapidly dissolves. There is a great amount of heat evolved by the chemical action and the solution is at first of a very light color, but it soon changes to a very dark brown, owing to the burning of the milk sugar and other constituents of the milk. The whole lot of bottles should be shaken at as nearly the same time as possible.



Babcock
Bottle.

WHIRLING THE BOTTLES.

The test bottles containing the mixture of milk and acid should be placed in the machine and whirled directly after the acid and milk have been thoroughly mixed. The bottles should be so placed in the machine, so that the equilibrium of the apparatus will not be disturbed. When all the test bottles are placed in the machine, the cover is placed upon the jacket and the machine turned at a speed not less than 1,100 revolutions per minute for not less than five minutes. A longer time will not affect the results. The bottles should never be whirled without placing the cover upon the jacket, as the cover not only prevents the cooling of the bottles when they are whirled, but in case any bottles become broken it will protect the face and eyes of the operator from injury by pieces of glass or hot acid. The bottles should be kept as hot as possible all through the test so as to keep the fat in liquid form. Always use the boiling hot water to fill the bottles and put a supply into the jacket to keep the bottles warm.

FILLING THE BOTTLES WITH HOT WATER.

As soon as the bottles have been whirled for *not less* than five minutes they should be filled up to the neck with hot water

IN SAVING BUTTER FAT IN ONE SHORT YEAR,

and then whirled for two minutes more, then filled up to about the 8 per cent. mark with hot water and again whirled for one minute, after which the fat should be measured. The bottles are most conveniently filled by placing a vessel containing boiling water above the machine, have a small spout in the side of the vessel at the bottom and attach a small rubber tube to the spout and run the water directly into the bottles without removing them from the machine. The flow of water can be controlled by a pinch cock upon the rubber tube. If only a few tests are made the bottles may be easily filled with a pipette.

MEASURING THE FAT.

When the fat is measured, it should be warm enough to flow readily so that the line between the acid liquid and the column of fat will quickly assume a horizontal position when the bottle is placed upright. Any temperature between 120 degrees Fah. and 200 degrees Fah. will answer, the higher temperature is preferred. To measure the fat, take the bottle from its socket, and hold it in a perpendicular position with the scale on a level with the eye observe the divisions which mark the highest and lowest limits of the fat. The difference between these gives the per cent. of fat. The reading can be easily taken to the half division or to one-tenth per cent. The line of division between the fat and the liquid is nearly a straight line, and no doubt need arise concerning the reading at this point, but the upper surface of the fat being concave, errors often occur by reading from the wrong place. The reading should be taken at the line where the upper surface of the fat meets the sides of the graduated neck of the test bottle, and not from the surface of fat in the centre of the neck of the bottle, nor from the bottom of the dark line caused by refraction by the curved surface. The reading may be made with greater convenience to the operator and less liability to error by measuring the volume of fat in the test bottle with a pair of dividers one point of which is placed at the bottom, and the other at the upper limit of the fat. The dividers are then removed and one point placed at the 0 mark of the scale on the bottle, the other will point to the per cent. of fat in the milk examined.

CALCULATING VALUE OF MILK.

The term per cent. of fat means a pound of fat in the milk. *Example.* 100 pounds of milk is delivered which tests 4.0 per cent. of fat, 100 pounds of milk $\times$ 4.0 per cent. = 4.000/1000 or 4.0 pounds of fat. *2nd Example.* 100 pounds of milk is delivered which tests 3.5 per cent. of fat. 100 pounds of milk $\times$ 3.5 per cent. of fat = 3.500/1000 or 3.5 pounds of fat. To obtain the number of pounds of fat contained in the milk multiply the pounds of milk delivered by the per cent. of fat found by the test and divide by 100.

In calculating the amount of butter manufactured per pound of fat divide the total pounds of butter manufactured by the total pounds of fat ascertained by the test. Usually the churned butter overruns the test about from one-fifth to one-tenth, or, in other words, one hundred pounds of butter should be manufactured from 80 or 90 pounds of fat. This depends altogether upon how the cream is taken from the milk whether skimmed clean or otherwise. If the per centage of fat is large in the skim-milk or buttermilk, or both, there will be less butter manufactured in proportion to the amount of fat ascertained by the test and *vice versa*.

TESTING SKIM-MILK AND BUTTERMILK.

Skim-milk, buttermilk and whey are tested in the same manner as prescribed for milk.

CLEANING THE BOTTLES.

The bottles should always be emptied as soon as the results have been read. The hot acid will then carry out all the fat and prevent any from adhering to the sides, as will be the case if the bottles are left until the fat has had time to become cold. After emptying the bottles, they should be washed out twice with hot water to clear them of any traces of acid or fat. A small brush made for the purpose should be used for cleaning out the neck of the bottle. It is always well to use a little pearline or caustic soda in the water for the first washing.

IF PROPERLY CARED FOR.

SUMMARY.

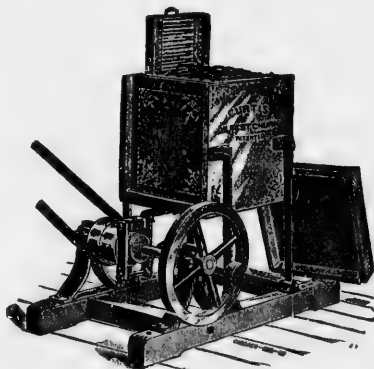
Experience with the Babcock milk test has taught operators to follow the directions laid down by Dr. Babcock, and in doing so to closely observe the following points:—

1. A thorough mixing of the milk.
2. Strength and quality of the acid.
3. The manner of pouring the acid into the milk in the test bottle.
4. Mixing the milk and acid in the test bottle.
5. Adding hot water to the test bottles in two portions and whirling after each addition of water.
6. Carefully measuring the fat.
7. The steady speed of the machine.
8. Keep the acid bottle tightly corked when not in use.
9. Always have a little liquid ammonia at hand in case of accident.
10. Keep all parts of the machine well oiled and everything in connection with it thoroughly clean.



The Oil Test Churn at Creameries.

The Oil Test Churn is an article of machinery used in the creamery, where the system of what is known as the "Cream Gathered Creamery Work" is followed for the purpose of testing the value of cream, and to enable the butter-maker to divide the proceeds from the creamery proportionately among



Oil Test Churn.

the patrons. It has become fashionable in many districts to speak of the oil test question as a vexed question, but every question is a vexed one, more or less, until it is thoroughly understood, and there is no reason why the oil test should not be understood by all, as its operation is simple and easily learned.

The Oil Test Churn is made like an oblong box set up on a frame and supported by means of flat iron legs and run by means of a centre crank, so that the box may be violently

GOOD INVESTMENT OF MONEY.

shaken, and run by belt and pulley from the shaft. Inside of this churn are placed what are called "cards," made of tin. These cards are filled with test tubes; these tubes have a mark on them about five inches from the bottom end. These are the tubes that are used for taking samples of cream from the farms. This churn cannot be revolved as the factory churn is, and as it requires concussion to make the butter separate from the buttermilk, the test churn is made to shake violently to produce that concussion, sending the cream from one end of the test tube to the other with all the force possible. Now, then, in order to have accurate results from this churn, it must be operated with the greatest care and exactness.

THE CREAM.

The best results will be obtained both with the test and the manufactured butter when the cream from each farm is of a uniform thickness and from the cream that tests about 100 by the oil test. The use of the Centrifugal Cream Separator will ensure uniformity in cream, as each patron could set his separator so that they all would produce cream of the same thickness, and no dairy farmer with five or more cows can afford to be without a separator, as they pay for themselves in a very short time.

SAMPLING THE CREAM.

This is a work that the drivers should be specially trained to do. The driver's pail is used to measure and ascertain the number of inches of cream that he receives from the patron. The cream should be poured about three times from the patron's can to the driver's pail to thoroughly mix it, the last time of pouring should be to deposit the cream in the measuring pail. The rule for the purpose should then be pushed down about the centre of the pail and pulled directly up, and the number of inches noted. Then the sample should be taken. The tube must be filled to the mark, and no *more* or no *less*. Very great care must be exercised in this, for here is where most of the difficulty in the tests arises. When cream is thick, the driver must use his judgment as to how much cream will

stick to the tube above the mark and in time run down to fill up to the mark. More cream will stick when it is thick, and less when it is thin. Here is one great reason why cream should be supplied that would test about 100. The operation of mixing and sampling as above should be repeated with every measuring pail of cream, and a sample taken of every measuring, even though a dozen samples might have to be taken from a patron. Thorough mixing is absolutely necessary, because the cream in the test tubes *must* be the same as that which is put into the can to go to the creamery, or the sample taken will be useless, as the butter produced would not churn out as the samples indicate. Here is the main cause of the question being a vexed one.



Oil Test
Tube

RIPENING THE SAMPLES.

The butter-maker must ripen the cream in the test tubes before churning, just the same as he does the cream for making the butter. Neglect of this will result in the oil test not churning out properly. There is usually about decimal two per cent. of fat left in the butter-milk, and the same will be found in the butter-milk at the bottom of the oil test tube. This makes them equal, as no shortage could arise from that source. The cream in the tubes may be properly ripened by placing the tubes in water over night at about 65 to 70 degrees Fah.

CHURNING THE SAMPLES.

That is the work of the butter-maker, and it is necessary that he should thoroughly understand what he is doing. If the samples do not churn out readily and clearly with one churning, they should be churned until they do come out right, even though it take a week to do it. It is almost impossible for a butter-maker to give the results of the day's work out to the patrons the same day that he receives the cream, as it is not at all likely that the samples will churn out so easily as to enable him to do so with any degree of accuracy. It is better to take

CREAM SEPARATORS ARE MADE OF THE

plenty of time with the test and be positive about the results than to hurry over it and give a haphazard report, and have dissatisfaction among the patrons. During the course of testing, it is possible that the samples may have to be heated and cooled repeatedly. This will depend on how the samples are prepared (ripened) for churning. While any clouds remain in the volume of fat in the tube, the churning of the sample should be continued, also the heating and cooling may have to be repeated.

READING THE SAMPLES.

This must be done with the accuracy that a chemist would exercise in his scientific work, and plenty of time should be taken to do it correctly. Some creameries have what is known as the "Frink Chart" for measuring the fat. This chart has a base line, at which the bottom of the test tube is placed when the fat is to be read. The operator must be careful in tracing out the lines on the chart, and be sure that he does not read above or below the lines reaching to the top and bottom of the fat volume. The chart is accurate and a good system to adopt for measuring. Another method is the "Burchard Rule," which is marked in tenths and hundredths, and the same care must be exercised with it as with the chart. One inch of cream in the gathering pail, a sample of which tests one inch, or, as it is called, ten-tenths, should churn out one pound of manufactured butter. If nine-tenths, it should churn out nine-tenths of a pound of butter.

Now, in conclusion, thoroughness in mixing, accuracy in sampling, thoroughness in churning the cream, correctness in measuring the fat, are the essential requirements to make the Oil Test Churn a correct test, for certainly it is correct when it is managed correctly in detail.

Results of an Exhaustive Experiment.

Cream Separator vs. Deep Setting.

The following is an average result of a series of experiments:—

	Separator.	Deep Setting or Gravity.
Pounds milk used	200	200
Per cent. fat in whole milk	3.4	3.4
Pounds skim-milk	157.5	162.
Pounds fat in whole milk	6.8	6.8
Per cent. fat in skim-milk	.1	1.5
Pounds fat left in skim-milk	.15	2.4
Per cent. fat unrecovered	2.2	35.3
Pounds of buttermilk	35.	33.
Per cent. of fat in buttermilk	.035	.16
Pounds of fat unrecovered in buttermilk	.03	.16
Pounds manufactured butter	7.25	5.5
Pounds milk to make 1 lb. butter	27.5	36.3
Per cent. fat per lb. butter	.93	1.23
Pounds butter per lb. fat in original milk	1.07	.80

Both samples of cream were treated exactly alike in ripening and churning. It will be seen that the separator result was far superior to the deep-setting or gravity system. The skim milk from the gravity system, which contained 1.5 per cent. fat, was heated to 90 degrees and put through the Melotte separator; 162 lbs. skim-milk yielded 25 lbs. cream which tested 8 per cent. fat, Babcock test. This cream gave 2.25 lbs. of manufactured butter, or 1.125 lbs. of butter per 100 lbs. of original milk.

To summarize. If a farmer had a herd of 10 cows, giving 4,000 lbs. of milk each in the year, and employed the gravity system of producing the cream, and he lost 1.12 lb. of fat in each 100 lbs. of milk, it would sum up as follows: Ten cows, giving 4,000 lbs. of milk each (which is conservative) equals 40,000 lbs. of milk, a loss in the skim-milk of 1.12 lbs. of fat to every 100 lbs. of milk equals 448 lbs. of fat lost in the skim-milk per year. To this add one-tenth of a lb. to each lb. of butter overrun per lb. of fat, as ascertained by the Babcock test (which is usual), equals 492.28 lbs. of manufactured butter lost in the skim-milk, which, if sold at 15c. per lb., would equal \$73.84 of a saving in one year. A separator sufficiently large to separate the milk of ten cows costs very little more than \$73.84; therefore, it is not economy for a farmer to carry on dairy work without a separator. The skim-milk from the separator is a matter well worth the farmer's consideration. It can be fed to calves and young pigs warm, fresh and sweet as it comes from the separator, and is much more valuable as a food than cold skim-milk from the gravity system. Better butter is always made from separator cream and always sells for a higher price. If separators were used by every butter-maker, the reputation of Canadian butter would be enhanced a hundred-fold.



PREVENT SHORTAGES IN DAIRY PROFITS.

DAIRY ACCOUNT.

JAN.	No. of Cows.	Daily Milk.	BUTTER.			FEB.	No. of Cows.	Daily Milk.	BUTTER.		
			Made.	Used.	Sold.				Made.	Used.	
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
12						12					
13						13					
14						14					
15						15					
16						16					
17						17					
18						18					
19						19					
20						20					
21						21					
22						22					
23						23					
24						24					
25						25					
26						26					
27						27					
28						28					
29											
30											
31											
TOTAL						TOTAL					

DAIRY ACCOUNT.

MARCH.	No. of Cows.	Daily Milk.	BUTTER.			APRIL.	No. of Cows.	Daily Milk.	BUTTER.		
			Made.	Used.	Sold.				Made.	Used.	Sold.
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
12						12					
13						13					
14						14					
15						15					
16						16					
17						17					
18						18					
19						19					
20						20					
21						21					
22						22					
23						23					
24						24					
25						25					
26						26					
27						27					
28						28					
29						29					
30						30					
31											
TOTAL						TOTAL					

DAIRY ACCOUNT.

MAY.		No. of Cows.	Daily Milk.	BUTTER.			JUNE.	No. of Cows.	Daily Milk.	BUTTER.		
Un- d.	Sold.			Made.	Used.	Sold.				Made.	Used.	Sold.
							1					
							2					
							3					
							4					
							5					
							6					
							7					
							8					
							9					
							10					
							11					
							12					
							13					
							14					
							15					
							16					
							17					
							18					
							19					
							20					
							21					
							22					
							23					
							24					
							25					
							26					
							27					
							28					
							29					
							30					
							31					
TOTAL							TOTAL					

DAIRY ACCOUNT.

JULY.	No. of Cows.	Daily Milk.	BUTTER.			AUGUST.	No. of Cows.	Daily Milk.	BUTTER.		
			Made.	Used.	Sold.				Made.	Used.	Sold.
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
12						12					
13						13					
14						14					
15						15					
16						16					
17						17					
18						18					
19						19					
20						20					
21						21					
22						22					
23						23					
24						24					
25						25					
26						26					
27						27					
28						28					
29						29					
30						30					
31						31					
TOTAL						TOTAL.					

[illegible]

SEPT.	No. of Cows.	Daily Milk.	BUTTER.			OCT.	No. of Cows.	Daily Milk.	BUTTER.		
			Made.	Used.	Sold.				Made.	Used.	Sold.
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
12						12					
13						13					
14						14					
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16						16					
17						17					
18						18					
19						19					
20						20					
21						21					
22						22					
23						23					
24						24					
25						25					
26						26					
27						27					
28						28					
29						29					
30						30					
						31					
TOTAL						TOTAL					

DAIRY ACCOUNT.

NOV.	No. of Cows.	Daily Milk.	BUTTER.			DEC.	No. of Cows.	Daily Milk.	BUTTER.		
			Made.	Used.	Sold.				Made.	Used.	Sold.
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
12						12					
13						13					
14						14					
15						15					
16						16					
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18						18					
19						19					
20						20					
21						21					
22						22					
23						23					
24						24					
25						25					
26						26					
27						27					
28						28					
29						29					
30						30					
						31					
TOTAL						TOTAL					

Mont

Jan.

Feb.

Mar.

Apl.

May

June

July

Aug.

Sept.

Oct.

Nov.

Dec.

TOTAL

DAIRY ACCOUNT SUMMARY.

BUTTER.

Used. Sold.

Months.	No. of Cows.	Milk per Mn'th	BUTTER.			REMARKS.
			Made.	Used.	Sold.	
Jan.						
Feb.						
Mar.						
Apl.						
May						
June						
July						
Aug.						
Sept.						
Oct.						
Nov.						
Dec.						
TOTAL						

DAIRY MEMORANDA.

General Information.

Table Showing the Number of Pounds to the Bushel
As Recognized by the Laws of Canada.

Wheat	60	Blue Grass Seed	14
Corn, shelled	56	Millet Seed	48
Corn, in the ear	70	Red Top Seed	14
Rye	56	White Beans	60
Oats	34	Castor Beans	46
Barley	48	Peas	60
Buckwheat	48	Potatoes	60
Timothy Seed	48	Sweet Potatoes	55
Clover Seed	60	Onions	57
Flax Seed	56	Turnips	55
Hemp Seed	44	Cornmeal	48
Hungarian Grass Seed.	48	Bran	20

Table of Weights.

Showing estimated number of pounds of Barbed Wire required to fence space or distances mentioned, with one, two, or three lines of wire, based upon each pound of wire measuring one rod ($16\frac{1}{2}$ feet).

	1 Line Lbs.	2 Lines. Lbs.	3 Lines. Lbs.
1 Square Acre	50 $\frac{3}{4}$	101 $\frac{3}{4}$	152
1 Side of a Square Acre	12 $\frac{3}{4}$	25 $\frac{3}{4}$	38
1 Square Half-Acre	36	72	108
1 Square Mile	1280	2560	3840
1 Side of a Square Mile	320	640	960
1 Rod in Length	1	2	3
100 Rods in Length	100	200	300
100 Feet in Length	6 1-16	12 $\frac{3}{4}$	18 3-16

THE "ALEXANDRA" AND "MELOTTE" CREAM SEPARATORS

Gain in Cattle.

It takes eleven pounds of milk to add one pound of live weight to a calf; and an ox that weighs 1,300 pounds will consume twenty-two pounds of hay in twenty-four hours to keep from losing weight. If he is to fatten, he must have just twice that quantity, when he will gain two pounds a day. Thus, one pound live weight is equal to eleven pounds good hay. To obtain 50 cents a hundred for his hay, a farmer must sell fat steers at \$5 50 per hundred pounds.

Three and a half pounds of milk are said to be equal to one pound of meat; and if we estimate a cow to give but 4,000 pounds of milk in a year, her product would be equal in food value to 1,000 pounds of meat, which would require a steer, under ordinary feeding, four years to produce; so that the cow produces as much return from her food in one year as a steer does in four years.

Calendar for Determining the Period of Gestation.

The average duration of pregnancy is, with mares, 48½ weeks, or 340 days (extremes, 307 and 412 days); cows, 40½ weeks, or 283 days (extremes, 264 and 306 days); ewes and she-goats, 22 weeks, or 150 days (extremes, 146 and 157 days); sows, 16 weeks, or 112 days (extremes, 109 and 133 days); hitches, 9 weeks, or 63 to 65 days; cats, 8 weeks, or 46 to 60 days.

Hens sit 19 to 24, generally 21 days; turkeys and pea-fowls, 26 to 29 days; geese, 28 to 33 days; ducks, 28 to 32 days; pigeons, 18 days from last egg; canaries, 13 days from steady sitting.

The following table will greatly facilitate reckoning the probable time of birth:—

ARE MONEY-MAKING, LABOR-SAVING MACHINES

FREQUENCY AND DURATION OF HEAT IN FARM ANIMALS.

Animal.	Duration of heat.	If not impregnated, heats recur after	After coming in, heat recurs.
Mare.....	Heat continues 1 to 6 days; the maximum 24 to 36 hours.	8 to 10 days.	9 to 14 days.
Cow.....		16 to 29 days.	28 to 42 days.
Ewe.....		17 to 20 days.	42 to *185 days.
Sow.....		20 to 40 days.	42 to 56 days.

*The time which it is customary to allow between lambing and the next service.

Suitable Age for Weaning.

Foals	12 to 16 weeks.	Lambs	12 to 16 weeks.
Asses	12 to 16 weeks.	Kids	8 to 10 weeks.
Calves	10 to 12 weeks.	Pigs	6 to 8 weeks.

Quantity of Seed Required to Plant an Acre.

Quarts.		Pounds.	
Beans, pole, Lima, 4x4 ft.	29	Clover, white Dutch	13
Beans, Carolina, prolific, etc., 4x3 feet	10	Clover, Lucerne.	10
Corn, sugar	10	Clover, Alsike	6
Corn, field	8	Clover, large red with timothy	12
Flax, broadcast	20	Clover, large red without timothy	16
Grass, timothy with clover	6		
Grass, timothy without clover	10		Bushels.
Grass, orchard	25	Barley	2½
Grass, red top or heads	20	Beans, in drills, 2½ ft.	1½
Grass, blue	28	Peas, in drills, short varieties	2
Grass, rye	20	Peas, in drills, tall varieties	1 to 1½
Pumpkin, in hills, 8x8 ft.	2	Peas, broadcast	3
Turnips, in drills, 2 feet	3	Potatoes	8
Turnips, broadcast	3	Rye, broadcast	1½
	Pounds.	Rye, drilled	1½
Beets and mangold, drills, 2½ ft.	9	Wheat, in drills	1½
Carrot, in drills, 2½ ft.	4	Wheat, broadcast	2

Shrinkage of Grain.

Farmers rarely gain by keeping their grain after it is fit for market, when shrinkage is taken into account. Wheat, from the time it is threshed, will shrink two quarts to the bushel, or

6 per cent. in six months, under most favorable circumstances. Hence it follows that 94 cents a bushel for wheat when first threshed, is as good, taking into account shrinkage alone, as one dollar in the following February. Corn shrinks much more from time it is first husked. One hundred bushels of ears, as they come from the field in November, will be reduced to not far from eighty. So that 40 cents a bushel for corn in the ear from the field is as good as 50 in March, shrinkage alone being taken into account. In the case of potatoes, taking those that rot and are otherwise lost, together with shrinkage, there is but little doubt that between October and June the loss to owner who holds them is not less than 33 per cent. This estimate is taken on basis of interest at 7 per cent., and takes no account of loss by vermin.

Postage Rates.

Canada

Letters, 2 cents for each oz. Newspapers, 1 cent for each 4 ozs. Books (limit 5 lbs.), 1 cent for each 4 ozs.

Parcels, not sealed, 1 cent for each oz.

Patterns and Samples (*bona fide*) of Merchandise, put up so as to admit of inspection (limit 24 ozs.), 1 cent for each 4 ozs.

Registration—Letters, Parcels and Samples, 5 cents.

United States.

Letters, 2 cents for each oz. Newspapers, 1 cent for each 4 ozs. Books (limit 5 lbs.), 1 cent for each 4 ozs.

Parcels, Patterns and Samples (limit 8 oz.), 2 cents for first oz., and 1 cent for each additional 2 ozs.

Foreign.

Letters to United Kingdom (except Australia or New Zealand), 2 cents for each $\frac{1}{2}$ oz. Papers, 1 cent for each 2 ozs.

BUY AN "ALEXANDRA" OR "MELOTTE,"

Registration, 5 cents. Books (limit 4 lbs.), 1 cent for each 2 ozs.

Merchandise (not Patterns or Samples) cost 1 cent per oz. in Canada.

Promissory Notes.

A promissory note is an unconditional written promise to pay to a specified person, a specified sum at a specified time. The person making the note is called the maker.

A note given on Sunday is void.

Notes bear interest only when so expressed; after due, however, they draw legal rate, six per cent. per annum. Notes payable on demand or sight draw no interest until after demand, or presentation, unless providing for interest on their face.

If "with interest," is included in a note, and no rate specified, it draws the legal rate. If a note is to draw interest higher than legal interest, it must be so specified.

When transferring a note, the endorser frees himself from responsibility of payment by writing "Without recourse" on the back above the name.

When a note is made payable at a definite date, three days of grace are allowed beyond that time to make payment. Notes payable on demand are not entitled to grace.

Notes due on Sunday or a legal holiday become due and payable on the following day.

If a note has been lost, mislaid, or destroyed, it does not release the maker from obligation, but the holder must make the formal demand, offering the maker a sufficient indemnity in the event of his paying the same.

Veterinary.

HOW TO GIVE MEDICINES.

The most ready manner of giving medicines is by mixing them with the food. This, however, is not always practicable, as the animal may refuse to eat the mixture, or may be too weak to make the effort to eat it. It must then be given by drench from a horn. In giving a drench to a horse, a horn should be used in preference to the bottle, for fear of breakage. Standing at the right shoulder, raise the head with the left hand under the jaw, and with the right hand pass the lip of the horn into the side of the mouth and empty its contents, the head being kept up until they are swallowed. If the animal is violent, place a twitch upon the nose, to be held by an assistant; or, if he refuses to open the mouth, the tongue may be gently held to one side, the horn introduced, quickly emptied, and the tongue liberated at once. Under all circumstances, the greatest gentleness must be exercised. Nothing can be gained by impatience or by harsh treatment. For the ox or cow liquid medicine is preferable, given from the bottle rather than the horn. The bottle is more manageable, and one is less tempted to use force to open the jaws, and perhaps thus lacerate the tongue also. Elevate the head only enough to prevent the liquid running from the mouth. The bottle should not be pushed back far into the throat. The tongue should be left free. The following is a very neat and efficacious method: If standing, place the left side of the animal against a wall, and standing on the right side seize hold of the upper jaw by passing the left arm over the head and bending the latter far round to the right, slightly elevating it. With the right hand pour the contents of the bottle into the mouth at its angle, using the least possible force.

SCOUR IN SUCKLING CALVES.

The calves come all right, appear healthy for about twenty-four hours after calving, then are attacked with scour, seem to be in much pain for a day or two, then die of inflammation, their eyes much sunken. The cows are fed on grains, cut hay and straw, roots, and a little cake; very few grains before calv-

ing. Roots should be given sparingly to pregnant cows, and carefully selected so as to exclude such as are in any way unsound. We would also advise you to abandon the use of grains, unless they are very fresh, and in no case to allow them at such a time in large quantities. A little sweet hay chaff, with a plentiful supply of cake, meal and bran, forms a good and wholesome diet at this period. Care should also be taken to avoid undue excitement, exertion, or fright, in the cow previous to parturition, all of which are capable of rendering the milk unfit for food.

To Calculate the Speed of Pulleys.

1. Revolutions of driver and driven and diameter of the driven being given, required diameter of driver.

Multiply the diameter of the driven by its number of revolutions and divide by number of revolutions of driver.

2. Given revolutions of driver and its diameter, to find diameter of driven to make a certain number of revolutions of shaft.

Multiply diameter of driver by its number of revolutions and divide by the number of revolutions required.

3. Given diameter of driver and driven, with number of revolutions of latter, to find number of revolutions of driver.

Multiply the diameter of the driven by its number of revolutions and divide by diameter of the driver.

Rule for Finding the Length of Belts.

Add the diameter of the two pulleys together, multiply by $3\frac{1}{2}$, divide product by two. Add to the quotient twice the distance between the centre of the shafts. The product will be required length.

THE "ALEXANDRA," AND "MELOTTE" CREAM SEPARATORS.

Constituents of Milk.

	Cow.	Goat.	Ewe.	Ass.	Mare.	Human.
Water	87.64	87.33	81.31	89.00	90.61	88.02
Fat	3.46	3.94	6.83	1.85	1.05	2.90
Casein	3.72	3.52	6.31	3.56	1.95	1.60
Sugar	4.42	4.39	4.72	5.05	6.29	7.03
Ash	.76	.82	.82	.54	.37	.81

Specific Gravities.

Water as unit	1000	Cream, average	995 to 1003
Pure Butter	.912	Whole Milk	1032
Butter of Commerce	.950	Skim-milk	1036

To find circumference of a circle—multiply diameter by 3.1428.

To find area of a circle—multiply square of diameter by .7854.

To find content of a cylinder—multiply area of base by the height.

An Imperial gallon is 277.274 cubic inches capacity.

A cubic foot contains very approximately $6\frac{1}{4}$ Imperial gals.



PREVENT SHORTAGES IN DAIRY PROFITS.

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88.02
2.90
1.60
7.03
.81

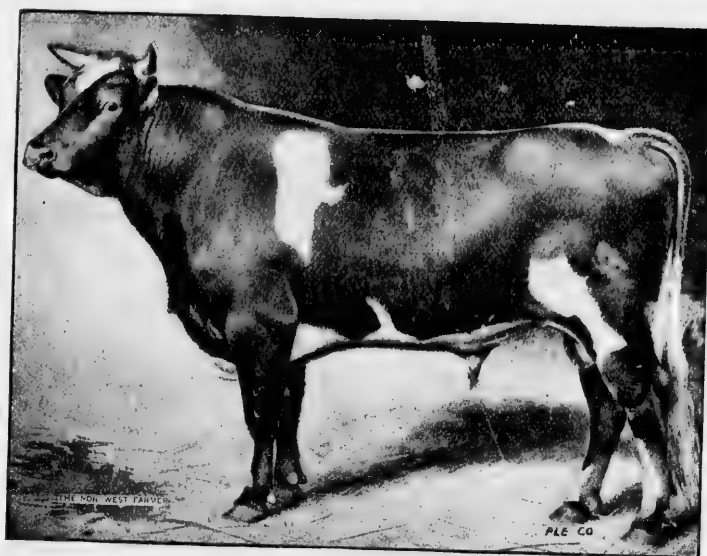
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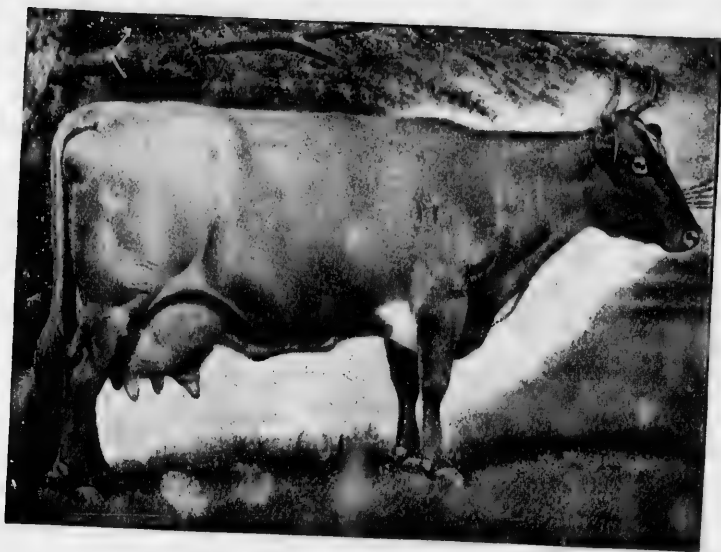
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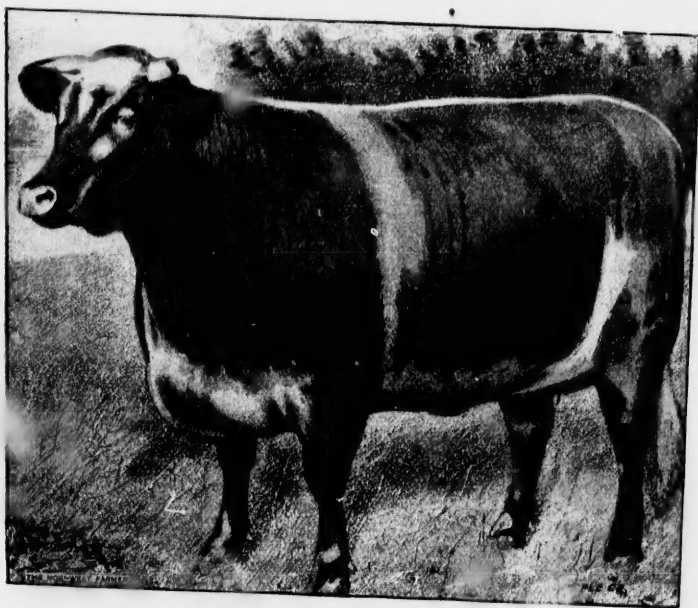
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A Typical Milking Strain of Shorthorn Bull.



A Typical Milking Strain of Shorthorn Cow.



A Beef Type of Shorthorn Cow.



A Beef Type of Shorthorn Bull.

Complete Outfit suitable for a Farm Dairy of 4 to 8 Cows

No. 12 Alexandra Cream Separator, 16 gallons per hour.	\$50 00
Cream Holding and Tempering Can, 6 gallons per hour.	4 50
No. 1 Daisy Barrel Churn (churns 4 gallons)	4 00
Lever Butter-Worker, No. 0 (works 12 lbs.)	3 50
Butter Spoon, 30c.; one Butter Spade, 30c.	60
Dairy Floating Thermometer	20
Jersey Butter Mould, 50c.; Strainer Dipper, 50c.; Hair Sieve, 70c.	1 20
Dairy Scales, weighing from $\frac{1}{2}$ an ounce to 240 lbs.	9 50
	\$73 50

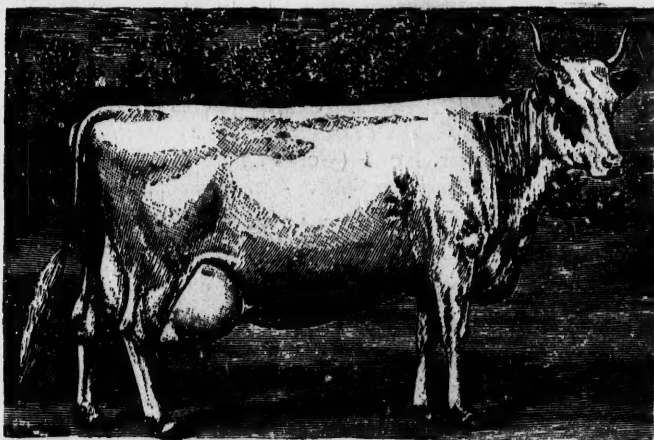
Complete Outfit suitable for a Farm Dairy of 8 to 16 Cows

No. 11 $\frac{1}{2}$ Alexandra Cream Separator, 27 gals. an hour	\$75 00
Cream Holding and Tempering Can, 10 gallons capacity	5 50
No. 3 Daisy Barrel Churn (churns 9 gallons)	4 75
Lever Butter-Worker, No. 1 (works 20 lbs.)	4 50
Butter Spoon, 30c.; Butter Spade, 30c.	60
Dairy Floating Thermometer	20
Jersey Mould, 50c.; Hair Sieve, 70c.	1 20
Strainer Dipper	50
Dairy Scales, weighing from $\frac{1}{2}$ an ounce to 240 lbs.	9 50
	\$101 75

Complete Outfit suitable for a Farm Dairy of 16 to 20 Cows

Melotte Cream Separator, No. 1, 35 gallons an hour	\$100 00
Cream Holding and Tempering Can, 15 gallons capacity	7 50
Daisy Barrel Churn, No. 5 (churns 10 gallons)	7 50
Lever Butter-Worker, No. 2 (works 30 lbs.)	5 00
Butter Spoon, 30c.; Butter Spade, 30c.	60
Dairy Floating Thermometer	20
Jersey Mould, 50c.; Hair Sieve, 70c.; Strainer Dipper, 50c.	1 70
Dairy Scales, weighing $\frac{1}{2}$ an ounce to 240 lbs.	9 50
	\$132 00

This latter outfit would be suitable for a Dairy of 20 to 30 cows if a No. 4 Melotte was substituted, separating by hand 70 gals. an hour, and no harder to turn than the 30 gals. per hour machine of any other makers. Price \$160.



A Typical Ayrshire.